

Radio Fun

BULK RATE
U.S. POSTAGE
PAID
PERMIT #1
MANCHESTER, NH

\$2.00

"The beginner's guide
to the exciting world
of amateur radio."

in this issue

features

- 6 Build this Cornerless Quad for 2 Meters K6KTS
- 7 Solder and Soldering K4CPR
- 12 Quarter-Wave Whip for your HT N6JSX
- 13 Repeater Etiquette NY2G
- 14 New Convert N5VGB
- 18 Building Global Friendships KK4WW, N0ISL, W6YMR

review

- 22 Radio Shack VHF/UHF SWR-Power Meter WB9RRT

vintage review

- 30 Heath HW-9QRP CW Transceiver WB8VGE

departments

- 17 Ad Index Staff
- 28 Flea Market Staff
- 5 Letters Staff
- 26 Radio Magic WB8VGE
- 14 Radio News Staff
- 10 The Tech Side KB1UM
- 16 Try Something New WB8ELK
- 29 Uncle Wayne's Bookshelf Staff
- 24 Upgrade . . . Don't Stop Now! WB6NOA
- 21 What Next? WB2MGP

Albania on the Air

From Erkki "Eric" Heikkinen OH2BBF in Hanko, Finland: The International Amateur Radio Union (IARU) team of operators/instructors returned safely [9 Oct. Release] from Tirana, Albania after a most successful mission. Not only were some 71,000 contacts established, but also 12 Albanian citizens passed the amateur radio exam and are ready for operating.

The newly founded Albanian Amateur Radio Association will still have many challenges before things are up and running. The organizers of the ZA1A project have agreed to assist in many critical areas. If you or your organization are willing to assist this DXCC country, you can contact DF5UG, I2MQP, OH2BH, N7NG, or JA1BK. They will be happy to provide you with information and facilitate your interest. The names and addresses of the 12 new Albanian amateurs will be made public shortly, so that you and they can make friends.

The Albanian administration has forwarded (to the IARU/ARRL) information concerning amateur radio licensing in their country. For the ZA1A project, the PTT and the National Frequency Commission—the highest radiocommunication authority—issued amateur radio license ZA1A for the period ending 7 October 1991. Beginning October 8, 1991, they began issuing additional licenses with the next license going to a French team arriving in Tirana. The administration plans to issue callsigns in the ZA1Z block to foreign nationals seeking to operate in Albania.

On October 8, 1991, the ARRL DXCC desk reviewed the ZA1A documentation and accredited ZA1A accordingly. The QSL cards are acceptable for DXCC credit immediately. The hard-working NCDXF team is busy entering the QSO data while the QSL card design is ready for the printer. The NCDXF is aiming for the shortest ever turn-around time in QSLing for any major DXpedition. The first cards were mailed on October 26. They also advise two (only) SAE/SASE—one for cards processed normally, and one for problem cards. The QSL address is NCDXF, P.O. Box 1, Los Altos CA 94023, USA.

The organizers of the ZA1A project would like to extend their most sincere thanks to their many supporters and friends. They would like especially to credit Mr. Albert Muller HB9BGN, who coordinated the logistical operations in Zurich and offered his hospitality to all team members enroute Tirana. They would also like to credit Mr. Erkki Heikkinen OH2BBF for his diligence in keeping the information flowing out of Tirana. Martti Laine OH2BH is project coordinator.

Text from the ZA1A QSL card: THE FIRST LICENSED AMATEUR RADIO OPERATION FROM ALBANIA. The mountainous Balkan state of Albania is bordered by the Adriatic Sea, Yugoslavia, and Greece. Its population of three million people is now opening its hearths and homes after many decades of very strict order. Albania, rich in natural resources and beauty, also has an exceptionally warm people that should be welcomed into our international community of nations.



Part of the ZA1A crew at Durres, Albania L-R: Pekka OH1RY, Training Supervisor for IARU ZA1A Team; Agim Muco, Secretary-General of the Albanian PTT; Martti OH2BH, Project Coordinator of ZA1A; and Chip K7JA, representing Yaesu.

The ZA1A team was given the honor of establishing amateur radio in Albania and training 12 Albanian students to carry that seed further. Albania is no longer a rare country in DX; it is now within reach and open for your visit. Indeed, ZAland can easily be the destination on your next itinerary. Contact ZA1A team members or any of the new licensees for details.

The ZA1A project has been a splendid example of international friendship among many individuals and national societies under the patronage of the International Amateur Radio Union (IARU). The assistance of the NCDXF, the Japanese CQ Publishing Company, the Yaesu Corp., and the Kenwood Corp. are also recognized by many of the Deserving throughout the world of amateur radio.

The international ZA1A team is comprised of DF5UG, I2MQP, I2KMG, I5FLN, IK0FEW, JA1BK, JA1HQQ, N7NG, K7JA, W7SW, OH2BH, OH1RY, OH1VR, and OH2BAZ. The international supporting team includes: Richard Baldwin W1RU, President of IARU; Shozo Hara JA1AN, President of JARL and David Sumner K1ZZ, Executive Vice President of ARRL. In the Albania hosting team are: Agim, Artur, Dajian, Fatma, Fredi, Geni, Ibrahim, Maksim, Toli—with Arben, Dali, Gezim, Jovan, Lushi, Mirela, Niko, Sadik, Teo, Ylber, and many others.

Generous Hams

Excerpt from a newspaper clipping sent to us by Lloyd M. Mitchell of Hartsville, South Carolina: Last fall, a 13-year-old girl in Travelers Rest, South Carolina, received thousands of dollars worth of amateur radio equipment from a man she had never met.

Thirty years ago, William M. Kessel decided that when he died, all his equipment would be given to the youngest ham radio operator in Greenville County. Seven months after he died, his last request was carried out, and Jessica Lawrence was presented with a double-wide trailer full of radio equipment.

Sam Peek, Kessel's attorney, called John Chiam, president of the Blue Ridge Amateur Radio Society, Inc., to ask for help in finding the county's youngest amateur radio operator. Chiam contacted the ARRL. At the time of Kessel's death in February 1991, Jessica was the youngest ham. She was first licensed at the age of 11.

Another heart-warming story was reported by Bob Melucci KD6BP in "Squelch Tales," Vol. XIX, of the San Diego Repeater Association: Melucci writes: "My son, Nick, decided to become a ham last summer. He took the Novice written exam last spring, when he was 9 years old. One month later, he sat for and passed the Technician portion. I was later told that he was the youngest person to pass an amateur test at the San Diego exam site.

When he took the Novice portion, George Perhac KJ6XP (ex W3WRQ) was one of the VEs. He was also gravely ill. Impressed with Nick's interest and age, and recognizing that youth are the lifeblood of amateur radio, George bequeathed to Nick his complete 10 meter station and a 2 meter HT. The gift was contingent upon Nick's obtaining an amateur license. Before Nick took the Technician written exam, George passed away.

Continued on page 25



The QSL Card for ZA1A.

New

Model DJ-F1T

The Miniature VHF/FM Handheld Transceiver

A super-compact handheld about half the size of a regular HT, the tiny DJ-F1T is a powerful communications station which fits literally in the palm of your hand.

The Ni-Cd battery is an innovative design, made to charge with the AC desk top, drop-in charging stand.

Standard on the unit are 40 memory channels, 3-stage power settings, pager and code squelch functions, several scan options, and full size illuminated keypad for easy operation and programming.

Ask to see ALINCO products at your dealer and become familiar with our quality line and accessories. We've always been here, and now we're ready to go wherever you do.

ALINCO... ON A MOMENT'S NOTICE.



ALINCO

ELECTRONICS INC.

ALINCO ELECTRONICS INC.
438 Amapola Avenue, Unit 130
Torrance, CA 90501
Tel. (213) 618-8616 Fax (213) 618-8758

Two Year Limited Warranty.

Specifications and features are subject to change without notice or obligation.

CIRCLE 67 ON READER SERVICE CARD

WE SHIP WORLDWIDE

Barry Electronics Corp.

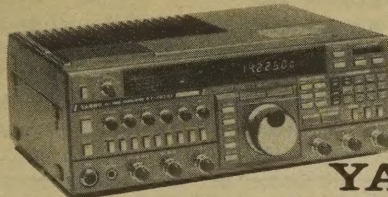
WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!



Santa Kitty says,
"Seasons Greetings To All!"

KITTY SAYS: WE ARE NOW OPEN 7 DAYS A WEEK.
Saturday & Sunday 10 to 5 P.M.
Monday-Friday 9 to 6:00 PM
Come to Barry's for the best buys in town



DRSI

ONV Safety
belts-in stock

YAESU

FT-767GX, FT-757GXII, FT-747GX, FT-990,
FRG-8800, FT-736R, FT-1000D,
FT-5200, FT-2400, FT-470



ICOM

IC-R71A, 751A, 781, 229H, R-7000, IC-765,
IC-726, 3220H, 735, IC-901, IC725,
IC-2410A/2500A, R-1, R-72, R-100

KENWOOD



ANTENNAS

A-S, AES, Cushcraft, Hy-Gain,
Hustler, KLM, METZ, Urban,
MODUBLOX, TONNA, Butternut,
Multi-Band

TS450S/AT, R-5000, TS-850S, TM 241A/
441A, TR-751A, Kenwood Service
Repair, TH225A, TM-631A, TS140S,
TS690S, RZ-1, TS-790A, TS950SD,
TH-77A, TH27/47A, TM-941A, TM-741A.

**AMPLIFIERS
STOCKED:**
RF Concepts
Mirage
TE Systems

MARINE RADIOS
ICOM M7, M11, M56, M700TY, M800
AVIATION PORTABLE ICOM A-21
KING KX-99

Budwig ANT. Products
FLUKE 77, 83, 85, 87 Multimeters

GEOCHRON

World Time Indicators

VoCom/Mirage/Alinco
VoCom/Mirage/TE SYSTEMS
Amplifiers & 5/8λ HT Gain
Antennas IN STOCK

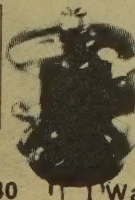
G&G ELECTRONICS ART1,
Air Disk, SWL, Morse Coach

Professional
Soldering
Station
48 Watts
\$79

Alpha Delta
Products
Stocked

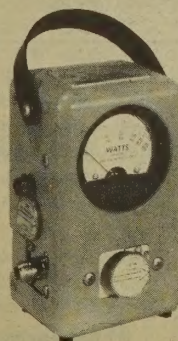
AEA Isopoles
(144, 220, 440
MHz), IsoLoop.

Philips DC-777



EIMAC
3-500Z
572B, 6JS6C
12BY7A &
6146B

BIRD
Wattmeters &
Elements
In Stock



Panasonic

Shortwave Radios/Marine

DAIWA
DIGITAL
WATT
METERS

COMMERCIAL
& HAM
REPEATERS
STOCKED.
WRITE FOR
QUOTES

MOTOROLA AUTHORIZED DEALER
KACHINA COMMUNICATIONS DEALER

AUTHORIZED SONY

DEALER

DIGITAL FREQUENCY COUNTERS
OPTOELECTRONICS model 1300 H/A, 0-1300MHz
2300, 2210 H, 0-2200 MHz, 2600H, UTC-3000

Long-range Wireless
Telephone for export in stock

BENCHER PADDLES.
BALUNS, LOW PASS FILTERS
IN STOCK

MIRAGE AMPLIFIERS
ASTRON POWER SUPPLIES
Belden Wire & Cable, Int'l Wire
OPTO KEYERS STOCKED

Kantronics
KAM, KPC II,
KPC IV, Data Engine,
DVR 2.2

Covercraft/Coaxseal Stocked

SHORTWAVE RECEIVERS
STOCKED

JRC
NRD-525,
JST135,
NRD-535



COMET ANTENNAS
STOCKED

HEIL
EQUIPMENT
IN STOCK

DRAKE

Hy-Gain Towers
will be shipped
direct to you
FREE of
shipping cost.



New TEN-TEC
PARAGON, OMNI V

IIX Towers, Antennas,
Mobile Radio mounts
stocked. Call.

AMERITRON AUTHORIZED DEALER

MAIL ALL ORDERS TO: BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012 (FOUR BLOCKS NORTH OF CANAL ST., BETWEEN SPRING AND BROOME ST.)

New York City's

LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aqui Se Habla Espanol"

BARRY INTERNATIONAL TELEX 12-7670

Monday-Friday 9 A.M. to 6:00 P.M.
Saturday & Sunday 10 A.M. to 5 P.M. (Free Parking)

IRT/LEX-"Spring St. Station". Subways: BMT-
"Prince St. Station". IND-"F" Train-Bwy Station"
Bus: Broadway #6 to Spring St. Path-9th St./6th Ave.
Station.

COMMERCIAL RADIOS
STOCKED: ICOM, Motorola,
MAXON, Standard,
Yaesu. We serve municipa-
lities, businesses, Civil
Defense, etc. Portables,
mobiles, bases, re-
peaters...

ALL
SALES
FINAL

Technical help offered upon purchase

We Stock: AEA, ARRL, Alinco, Ameco, Ameritron, Antenna Specialists,
Astatic, Astron, B&K, B&W, Belden, Benchner, Bird, Butternut, CDE, CES,
Cushcraft, Daiwa, Eimac, Henry, Heil, Hustler, Hy-Gain, Icom, KLM,
Kantronics, Larsen, MJF, Mirage, Nye, Palomar, RF Products, Saxton,
Shure, Tempo, Ten-Tec, TUBES, Yaesu, Vibroplex, Duplexers, Repeaters,
Scanners, Radio Publications, Uniden, Kenwood, Maxon, RFC.

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS
HAM DEALER INQUIRES INVITED PHONE IN YOUR ORDER & BE REIMBURSED
COMMERCIAL RADIOS stocked & serviced on premises.

Amateur Radio Courses Given On Our Premises, Call
Export Orders Shipped Immediately. TELEX 12-7670

FAX: 212-925-7001

What is SARA?

SARA, a French radio astronomy satellite launched last July, will be measuring radio frequencies from Jupiter. These signals can only penetrate earth's F, E, and D layers at the highest end of the spectrum. In space, solar and earth radiation is small compared to that of the giant planet's, so results are expected to be good.

SARA has a 1-watt NBFM output. It is 300 baud ASCII coded into 1200 Hz and 2400 Hz AFSK audio tones and transmitted at 145.995 MHz. SARA is a very simple satellite with three perpendicular 5 meter antennas that produce a combined quasi-isotropic pattern; hence, there is no need for stabilization. Its 340mm cube is powered by 60% coverage of solar cells feeding the battery, with no need for power or voltage regulation. The other 40% of the surface is painted so as to passively regulate the temperature to around +20 degrees C. It uses non-space qualified, normal consumer available components with no redundancy as backup. *TNX OSCAR Satellite Report, No. 231, SpaceNews, Satellite Operator Number 13, and G3IOR.*

Thanks from Mir

KP4BJD reports that Cosmonauts Sergey U5MIR and Anatoly U7MIR pass along their kindest regards and warm-hearted greetings as a measure of their appreciation to all the amateurs who have contributed news and information to their personal message system, U5MIR-1. Like the AREMIR Austrian Amateur Radio Experiment, the frequency of operation is 145.975 MHz. During a voice contact, Sergey expressed interest in contacting the next U.S. ham mission in space, currently scheduled for next May. *TNX SpaceNews de KD2BD.*

Tornado Warning

You can use your TV set or radio as a tornado warning device. Use the TV set first. Warm it up and tune in channel 13; darken the screen to almost black, using the brightness control. Next, tune in channel 2 and turn the volume control down. Your tornado detection device is now in operation.

Lightning will produce momentary white bands of varying widths across the screen (color sets produce colored bands). A tornado within 15 or 20 miles away will produce a totally white screen, which will remain white (a totally colored screen on color sets). This occurs because lightning and tornadoes generate RF energy at about 55 MHz (channel 2), which overrides the brightness control.

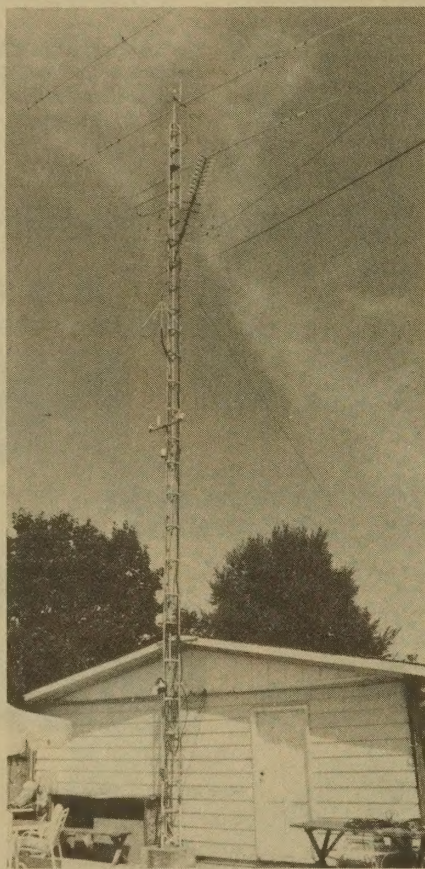
Channel 13, which is at the high end of the VHF band, is not affected. That is why the brightness control is set at that channel. If the screen whites out (or colors out), turn off your TV set, take your portable radio, and seek a place of shelter immediately.

Use the portable radio for emergency instructions, and in case of power failure. If the radio is turned to the 550 kHz–1600 kHz AM band, lightning will cause intermittent static. A tornado will cause steady, continuous static. Most homes have these two warning devices handy. It might be well to keep a copy of the instructions near your radio or TV during tornado season. *TNX The OMik Communicator, Fall 1991.*

Another Opportunity

The Adventist Prison Commission, Inc., P.O. Box 459, Deer Park TX 77536, needs equipment and expertise in building up their mobile and base stations. Here's another opportunity to make a difference and have fun doing it. Any donations of time, skill, money, or equipment will help the commission, headed by Tim Culver, teach amateur radio to young people who have parents in prison. These young people often have no adults to guide them in creative, enjoyable activities that are also exciting and educational—and provide a service to the community as well. For more information, call Tim Culver (whose callsign is on the way) at (800) 327-1660.

Easy Rotor Installation



Here's a tip from Harry B. Elliott N8JQN: It's common practice to mount the antenna rotor high up on the tower, just a few feet below the antenna. In most instances, this means the rotor is approximately 50 to 100 or more feet above the ground. But my hobby is NOT climbing towers.

I mounted my rotor at eye level (see the photos), and I ran regular TV antenna mast from the rotor up to the mast to where the antenna is mounted.

It's a good idea to drill a hole and run a screw through the joints of the TV antenna mast to prevent slippage.

Just a couple of feet above the rotor, I supported the entire weight of the antenna and mast with a thrust bearing—so there is no weight on the rotor.

This rotor mounting accomplishes several things: 1. Easy access to the rotor for maintenance. There is no antenna climbing! 2. Easy removal of the rotor. The antenna does not have to be lifted. 3. A higher degree of safety, especially in high winds. The weight and mass of the rotor are not located at the top of the tower. 4. More economical. Less rotor cable is needed.

Photo A. This ground-level rotor installation (for a 50-foot tower and Cushcraft A3S antenna with 40m add-on kit) has worked well for N8JQN for the past three years.

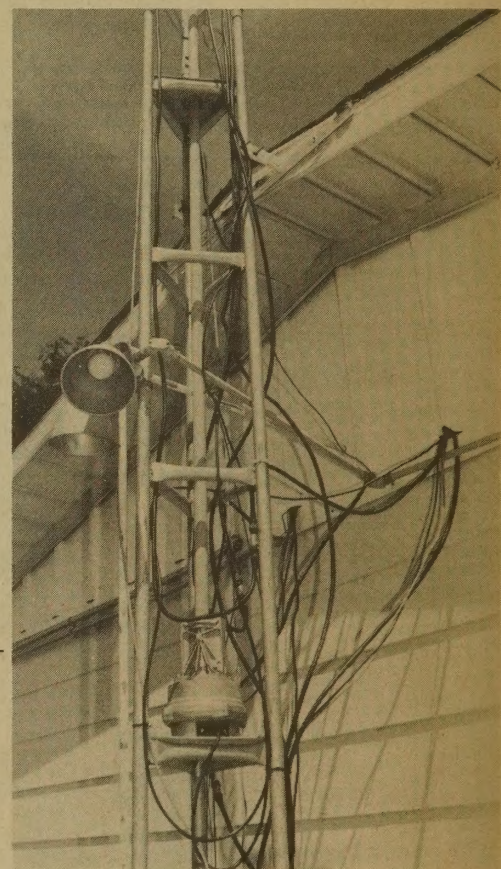


Photo B. Details of the rotor and thrust bearing.



AMSAT

Dedicated to Keeping Amateur Radio in Space!

AMSAT — The Radio Amateur Satellite Corporation is an organization of Radio Amateurs who design, build and launch satellites for use by Radio Amateurs around the world.

Your new Amateur Radio License will be your ticket to a whole world of exciting opportunities. Why not expand your horizons even further by becoming a member of AMSAT and participating in space aged Amateur Radio?

Join the Excitement! Join the Fun! Join AMSAT!

Yearly Membership dues: \$30 U.S., \$36 Canada/Mexico, \$45 Elsewhere **JOIN NOW!**

Name _____ Call _____

Address _____

City _____ State _____ Zip _____

\$15 of membership dues goes toward a subscription to *The AMSAT Journal*

Post Office Box 27, Washington, DC 20044
Telephone 301-589-6062 Fax 301-608-3410

"Secondary" Ham Communications

In a speech at the ARRL National Convention at Saginaw, Michigan, FCC Private Radio Bureau Chief Ralph Haller said he was receptive to permitting a "third type" of non-amateur communications on the amateur bands. At present, only two types of amateur communications are allowed: emergency and "all other" permitted amateur communications, such as rag-chewing. This third type would be permitted when the ham bands were not being used for the first two types.

And what is this third type? The use of ham radio for such things as personal and club business, ordering pizza via autopatch, providing information to the news media, rebroadcasting news and weather bulletins (NASA, NOAA, WWV, etc.), and supporting communications for local government, civic, and nonprofit activities.

The question is: If Rule 97.113, "Prohibited Transmissions," were changed to permit this third type of secondary transmission, to what extent, and in what ways, would it change amateur radio as a hobby?

Radio Fun

december 1991
issue #5

editor/publisher
Wayne Green W2NSD/1
associate publisher
David Cassidy N1GPH

managing editor
Bill Brown WB8ELK
production editor
Hope Currier
senior editor
Linda Reneau KA1UKM
associate editor
Joyce Sawtelle
contributing editors
Mike Bryce WB8VGE
Michael Geier KB1UM
Carole Perry WB2MGP
Gordon West WB6NOA

advertising sales representatives
Dan Harper
Louise O'Sullivan
advertising coordinator
Sue Colbert
1-603-525-4201
1-800-225-5083
FAX (603) 525-4423

production manager
William H. Heydolph
art director
Alice Scofield
desktop page make-up
Sue Allen
graphic services
Dale Williams
Terry Verville
graphics photographer
Dan Croteau

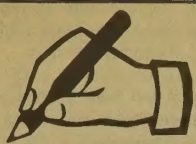
wge publishing inc.
chief financial officer
Tim Pelkey
circulation manager
Harvey Chandler
circulation coordinator
Viki Van Valen

editorial offices
Radio Fun
Forest Road, Hancock NH 03449
603-525-4201, FAX (603) 525-4423
Write to Radio Fun WGE Center,
Forest Road, Hancock NH 03449.

RADIO FUN (ISSN 1055-887X) is published monthly by Radio Fun, a division of Out to Launch Communications, Inc., Forest Road, Hancock NH 03449. Charter Subscriptions: \$9.95 per year. Canada add \$7.00 plus 70¢ GST. Foreign add \$12.00 surface, \$32.00 airmail. Second class postage pending at Hancock NH and additional mailing offices.

POSTMASTER: Send address corrections to RADIO FUN, P.O. Box 4926, Manchester NH 03108.

Entire contents ©1991 by Radio Fun. No part of this publication may be reproduced without written permission from the publisher.



Deborah Riehl, RN, KB7NFL, Bothell WA I'm an emergency department RN, and a Search and Rescue (SAR) volunteer. My first patient one morning was a woman nine months pregnant who fell asleep at the wheel and wrecked her car. I wondered why someone would fall asleep at the wheel at 0900.

The patient was wearing her seat belt and denied injury, but was having a few contractions, so I called a labor and delivery nurse down to monitor mother and baby. I left the room to chart notes, and when I returned there was a 2 meter HT parked on top of the monitor. The patient was a ham, and she'd spent the night as an ARES and Red Cross volunteer at a major apartment fire, finding housing for people who were left homeless. And she was still thinking of others.

She was worried that her radio would interfere with the monitor. When reassured about that, she tried to reach her husband on the SAR repeater to tell him where she was. I loaned her my half-wave extendable, and she was able to contact him.

Shortly he arrived with four other children in tow. I learned that whenever Linda is pregnant, she studies and upgrades. She must be going for Extra!

Don Payne KB5MRA, Rosebud TX I want to say a few words regarding the no-code Tech license. It seems that in many areas the no-code class is perceived to be a problem. Fortunately, in our area, that is not the case. The Temple Amateur Radio Club (TARC) has begun teaching no-code classes, and students wishing to go on and learn the code are elmered after passing the written portion. They also are encouraged to join others on a 2 meter simplex frequency, working with practice oscillators (or keyers, if they have them) to bring their speed up to whatever is needed for the class of license they seek.

Around here, the term "no code" is hardly used. The "no code" is not some splinter group whose members are tagged. If those who consider code an integral part of being a good amateur operator would climb off their high horse and get to elmering the newcomers in the delights of code, and make it fun, instead of trying to browbeat them into submission by making them feel like outsiders. I believe they would find the results more to their liking, as well as self-satisfying.

It took me nearly a year to get code at 5 wpm. If I had had the opportunity to get a code-free license, I'd have jumped. But I am already trying to get my code speed up for Extra. I'm hoping for a codeless Extra class entry-level license—Hi, hi!

Regarding the letter in issue number 3 from David Yancey: If you're not certain you want to spend your hard-earned money on study materials for your license without knowing what amateur radio is all about, I'd recommend going to a couple of your nearest ham club's meetings. If their club is anything like ours, they probably will start pestering you to take their classes, look at their stations, come to their special events, or be chairman or co-chairman of the next Field Day. Hi! It seems most clubs

letters

ask all in attendance to introduce themselves. When your turn comes, say something like, "My name is David, and I'm interested in finding out what ham radio is all about."

As for John Myers, I've been into CB since 1968, and I am not ashamed of it. I also feel no need to defend that fact. There's room in my life for more than that, however.

My 14-year-old daughter, Missy KB5PQJ, will be surprised to learn she's an "old geezer." She's been licensed since she was 13, and not close to being alone. A growing number of schools have ham clubs, thanks to enlightened people like Carole Perry WB2MGP.

What I want to say to young readers is: You could be the start of something fantastic in your area if you develop a positive attitude and do it! However, the knowledge and history the older people could share is priceless.

And what about that old "geezer-in-chief" Wayne Green? Perhaps someone will have a certificate made up for him, to that effect. (At 40, I suppose I'm an "associate geezer.") Mr. Green may not be young in years, but he has more energy than most of today's youth—mentally as well as physically. He doesn't need me to defend him, so I'll only add that I wish I had some of the water from whatever fountain he drinks from.

Joe Mocker W2CZP, Schenectady NY I am an old-timer and know your publication is for Novices and Technicians, but is it fun to read!

Jeffrey L. Wheat N6ZYX/AG (ex KC6KVM), Norton AFB CA I just got issue #2 of Radio Fun, both issues are good. I was thinking that you might have a short trivia or "history notes" feature or department exploring, say, one question per issue.

I plan to share this issue with my ham class at church for Cub Scouts, Boy Scouts, and anybody else wanting to learn. It was not that long ago that I was having a hard time getting 5 wpm when my wife Gloria (now KC6JZR) started taking my oldest son Shaun (now KC6KRZ), age 7, to a kid's ham class. Both of them snookered me to Novice. I was proud and inspired that much more. The instructor of my class used me as an example for others to invite all kids to become hams.

Last club election, Shaun, then almost age 9, wanted to run for president. His idea was to make things more fun. More later!

So . . . Did Shaun get elected? David N1GPH

Louie Metz N5SQV, Bella Vista AR Hooray for Radio Fun. More fun! I enjoy any articles you might have on antennas, feedlines, connectors, coax cable, and anything else of interest to dumb hams like me—not too technical!

I enjoy your magazine, and I was tickled when I got a copy in the mail today—only to discover I already had issue #2! Enclosed are the labels on each—I only need one per month—but will give this extra copy to a new ham! I think your magazine is great for us

Continued on page 8

MFJ's world famous Ham Radio Accessories

Why do more hams throughout the world use MFJ accessories than any other brand? Because they are value packed and carry MFJ's one year unconditional guarantee!

MFJ Speaker Mics

Compact or miniature models for all popular HTs

Compact Speaker Mics, \$24.95 each:

Once you try an MFJ Speaker Mic you'll never want to be without it. You'll be able to carry your handheld on your belt and never have to remove it to monitor calls or talk.

You'll never have to turn up your audio annoyingly loud to monitor calls because it's handy lapel/pocket clip lets you keep it close to your ear for easy listening.

And you'll never have to clumsily remove your handheld from your belt holder to talk because you can conveniently take the speaker mic in one hand, press the push to talk button and talk. Measure 1 1/4" x 2" x 3"

They come with a lightweight retractable cord that eliminates the dangling cord problem. They feature excellent audio on both transmit and receive. MFJ-284 for Icom or Yaesu; MFJ-286 for Kenwood.

Miniature Speaker Mics, \$24.95 each:

New miniature speaker mics pack all the features of the compact models into a tiny 2" x 1 1/4" x 1/4" package. The lapel pocket clip swivels for even more convenient positioning. Also features transmit LED. Choose from regular or "L" shaped connector. Order MFJ-285 or MFJ-285L for Icom or Yaesu, MFJ-287 or MFJ-287L for Kenwood. MFJ-283 for dual plug Alinco.

Deluxe 300 W Tuner



MFJ-949D
\$149.95
MFJ-949D is the world's most popular 300 watt PEP tuner. It covers 1.8-30 MHz, gives you a new peak and average reading Cross-Needle SWR/Wattmeter, built-in dummy load, 6 position antenna switch and 4:1 balun -- in a compact 10 x 3 x 7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

SWR Analyzer

MFJ's innovative new SWR Analyzer gives you a complete picture of your antenna SWR over an entire band -- without a transmitter. SWR meter or any other equipment!

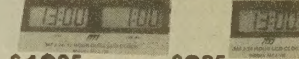
Simply plug your antenna into the coax connector, set your SWR Analyzer to the frequency you want and read your SWR. You can instantly find your antenna's true resonant frequency, something a noise bridge can't do. Covers 1.8-30 MHz (or choose MFJ-208, \$89.95 for 2 Meters). Use 9 V battery or 110 VAC with MFJ-1312, \$12.95.

VHF SWR/Wattmeter

MFJ-812B
\$29.95
Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4 1/2 x 2 1/4 x 3 in.

MFJ Multiple DC Outlet
MFJ-1112
\$29.95
New MFJ DC Power Outlet saves you space and money. Hook it to your 12 VDC power supply and get 6 DC outlets for connecting your accessories. RF bypassing keeps RF out of power supply from DC line outlet. 1 3/2 x 2 3/4 x 2 1/2 in.

12/24 Hour LCD Clocks



\$19.95 MFJ-108B \$9.95 MFJ-107B
Huge 5/8 inch bold LCD digits let you see the time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4 1/2 x 1 x 2; MFJ-107B 2 1/4 x 1 x 2 in.

MFJ Cross-Needle SWR/Wattmeter

MFJ-815B
\$69.95
MFJ Cross-Needle SWR/Wattmeter has a new peak reading function! It shows you SWR, forward and reflected power in 2000/500 and 200/50 watt ranges. Covers 1.8-30 MHz.

Mechanical zero adjusts for movement. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Deluxe Code Practice Oscillator



MFJ-557
\$24.95
MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable because it runs on a 9-volt battery (not included) or an AC adapter (\$12.95) that plugs into a jack on the side.

Tone and Volume controls for a wide range of sound. Speaker, earphone jack. Key has adjustable contacts and can be hooked to transmitter. 8 1/2 x 2 1/4 x 3 3/4 in.

Nearest Dealer/Orders: 800-647-1800

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; FAX: (601) 323-6551
TELEX: 53 4590 MFJ STKV

• One year unconditional guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • Add \$5.00 each s/h • FREE catalog
MFJ . . . making quality affordable

CIRCLE 86 ON READER SERVICE CARD

Build This Cornerless Quad for 2 Meters

Here's an antenna that you can cut corners on. All you lose is high cost.

by Nick Testa K6KTS

A little over a year ago my oldest son, Nick, now KA6OXP, expressed an interest in becoming a ham. After I dusted off a lot of vacuum tubes, it became clear that some new equipment was in order. Among the things purchased was a pair of 2 meter hand-held transceivers.

Back on 2 meters after many years, I wondered whether I could work some DX and contact my old friend Tom WA6FIO. Tom lives some 50 miles away, across Los Angeles. Our first contact was via

repeater but left a lot to be desired in a rag-chew, with timers, QRM, and breaks to contend with. After spending a modest fortune to re-equip our ham shack, the prospect was dim for obtaining a linear or even a commercial high-gain 2 meter antenna. Enter LC4ELQ!

The LC4ELQ

The LC4ELQ is the answer to the question of how to boost your signal and reception on 2 meters at the lowest cost. If

you have a low-power hand-held and want to use simplex across substantial local distances, as I did, or an SSB transceiver and are looking for the real DX, then LC4ELQ is for you.

It stands for Low Cost 4-Element Loop Quad. The antenna design is based on the 4-element quad but with some important changes to cut costs and simplify construction. A well-stocked junk box may contain all the necessary parts. Even if you have to buy all the parts new, except for an entire case of wire (which you will need only a small portion of), the expense will be under \$10.

Construction

My trip to the junk box yielded some 3/4-inch schedule 40 PVC pipe left over from a sprinkler system installation and a quantity of #8 aluminum ground wire (Radio Shack #15-036) left over from grounding my low-band rig.

Since I was interested in the design which would have the best chance of being self-supporting, I decided to make the elements loops instead of squares. This has the added advantage of allowing ad-

justment of the element size without the constant adjustment of corners. This in fact proved very handy at the tune-up stage. Due to the stiffness of the #8 wire, adjusting corners would have made the antenna look like it had been salvaged after being hit by a truck.

Four pieces of the wire were cut to length for a driven element, a reflector, and two directors. The lengths were determined as in a 2 meter quad design, such as is found in the *ARRL Antenna Book*, plus one inch to allow for forming hooks at the attach points, less the length of the bolts through the boom for the reflector and director elements. In those three elements the 1/4" x 2" bolts serve as one inch of the resonant length. Each element was then formed into a hoop with the ends bent at 90 degrees and then bent to fit around the bolt and screw heads.

The next step was to prepare the boom and mast. I cut the 10-foot piece of PVC into a four-foot and a six-foot length. I also cut the top bar of a PVC T-joint in half lengthwise. The stem portion of the T was glued to the end of the six-foot piece of tubing to form the mast. I mounted the four-foot length for the boom in the U-shaped cradle formed by the remaining top of the T, using a pair of 1-1/2-inch diameter hose clamps. The hose clamps can be loosened to allow for rotation of the boom for vertical or horizontal polarization.

Three 1/4-inch holes were drilled through the boom, one for the reflector and one for each of the directors. A 5/64-inch hole was drilled through the boom for the driven element. A 1/4" x 2" hex-head bolt was passed through each of the larger holes, with a pair of flat washers on

each side of the boom. The small hooks at the ends of the elements were slipped between the washers at each side and a nut was used to fasten the assembly.

For the driven element, a #8 x 3/4" sheet-metal screw was inserted in each side of the boom. Each screw has a pair of 1/4-inch washers and a #8 washer, nearest the head, mounted on it. When the driven element is mounted, the shield and center conductor of 50 ohm coax are connected, one to each screw. The screw acts as a terminal to connect the coax to the antenna. Solder or crimp #8 spade lugs to the end of the center conductor and shield to ensure good attachment to the antenna.

To tune the antenna, I adjusted the element lengths and spacings until the antenna provided a nearly perfect match to the transceiver across the entire 2 meter band. This gave me a prototype antenna with a few extra holes in the boom. The final lengths are shown in the table of element lengths. Be sure to note that the table gives the length between the 90-degree bends, not to the tip of the wire. I recommend that you form a 90-degree bend and a small bolt hook on the end of the wire and then measure to the next bend point. Make the bend, allowing enough wire to form the hook around the bolt or screw, and then cut the entire piece off.

In making the SWR measurements, I noticed that the relative motion between the elements was enough to change the SWR. To prevent this, I added three pieces of fishing line tied to each element and to the ends of the boom, which extend beyond the elements. If, for example, the loop is fed at the six o'clock position looking at the antenna straight down the boom, a length of fishing line runs along the nine, 12, and three o'clock positions. A knot was tied at each element with a slight inward bend of the wire at the knot point to retard slippage. The ends of the three pieces of fishing line were tied together and then passed through spare holes at each end of the boom. George N6FFA, in testing copies of the antenna, found that squareness to the boom and parallelism of the elements to each other reduced the rear lobe of the antenna. That means you should do the best job you can in these areas. For long-lasting protection of your connections, wrap each with electrical tape or, better yet, use a commercial silicone sealant to cover them.

Polarization

What would you like? Since I was interested in FM, I wanted a vertically-polarized antenna. I rotated the boom so that the feed point was on the side, three o'clock or 9 o'clock looking down the boom. This gave me vertical polarization. For horizontal polarization, place the feed point at the top or bottom of the loop, 6 o'clock or 12 o'clock. With vertical polarization, N6FFA did notice a reversal of the deep rear-side notch in the pattern, depending upon which side the feed point was on.

Testing

Initial tests were made with the mast held by rubber bands to the desk drawers in my shack and the boom six feet off the floor. Readings were taken on a Swan VHF reflected-power meter. Also checked was the performance in vertical and horizontal polarization, and rough

Element Wire Lengths		
Length in Inches from 90° Bend to 90° Bend		
Element		
Director #2		73-3/8
Director #1		74-3/8
Driven Element		79
Reflector		83-1/4

Element Center-to-Center Spacing		
Distance in Inches		
From	To	
Boom end	Director #2	6
Director #2	Director #1	11-3/4
Director #1	Driven Element	8-5/8
Driven Element	Reflector	14-1/8
Reflector	Boom End	= 7

Frequency in MHz	Measured SWR Final Adjustment Values (Swan)	Measured at 40 ft. (Bird)
144.0	1.35	1.45
144.5	1.20	1.25
145.0	1.00	<1.14*
145.5	1.00	<1.10*
146.0	1.00	<1.10*
146.5	1.10	<1.10*
147.0	1.30	<1.10*
147.5	1.40	1.22
148.0	1.55	1.35

*Lowest reading on the chart.

S-Meter Measured Antenna Pattern	
Degrees	dB over S9
0 (front)	30
15	28
45	28
75	28
135	10
165	20
(-back)	
195	19
225	20
255	25
315	25
345	28

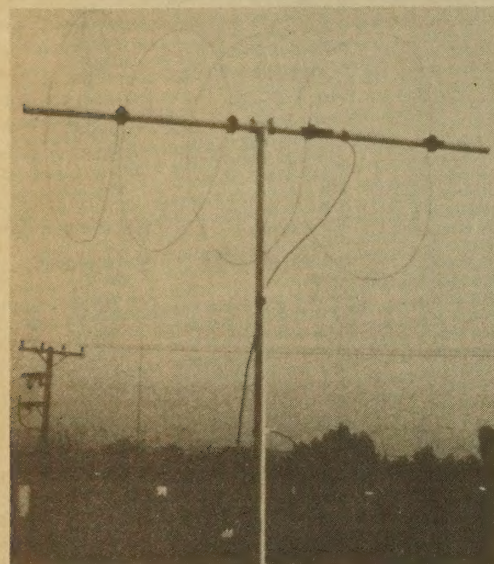


Photo A. The LC4ELQ.

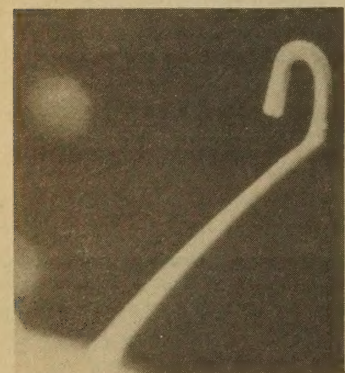


Photo B. Forming the bolt hook and the 90° bend.

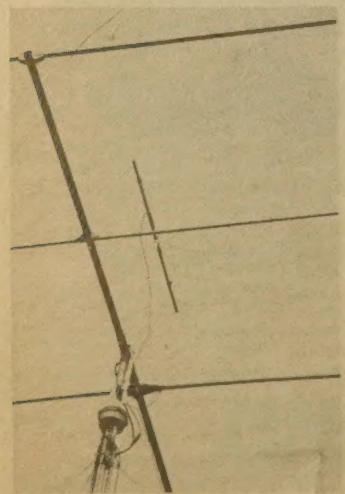


Photo C. The LC4ELQ antenna mounted

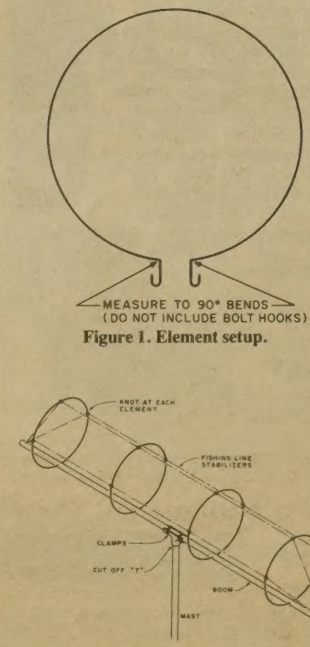


Figure 1. Element setup.

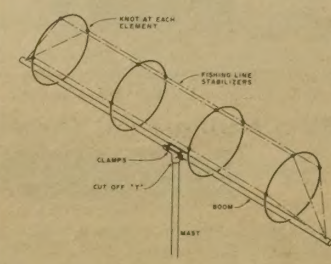


Figure 2. Mounting pattern for the

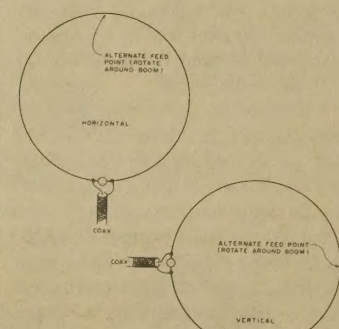


Figure 3. Feed points for horizontal and vertical polarization.

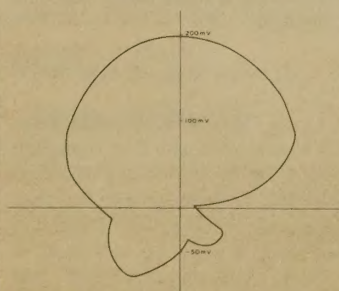


Figure 4. Antenna pattern measured by N6FFA and KD6EH in millivolts of signal. The LC4ELQ was used as the transmitting antenna and rotated to produce the pattern.

checks of directionality were made. The antenna was then clamped above my trib-ander at 40 feet. SWR tests were then repeated using a Bird Model 43. Both sets of test results are shown in the tables.

With the help of Judi WB6SKE, I made the first pattern check. It indicated a front-to-back ratio of 20 dB. This data is also shown in the table. The distance between our QTHs is about four miles. N6FFA and Greg KD6EH made the radiation pattern graph shown from the millivolts of signal measured at Greg's location about 12 miles away from N6FFA.

Performance

Yes! I was able to work WA6FIO simplex at nearly full-quiescent across the Los Angeles QRM with 1.5 watts. This same power level has easily provided reliable, nearly full-quiescent communications via repeaters located in other cities nearly 200 miles away. My QTH is situated on flat land at about 50 feet above sea level, so our own elevation is not a factor. Several other local hams have built and used the antennas on both FM and SSB with excellent results. I constantly receive the comment on the air, "You're that far away and just using 1.5 watts; that's some antenna!" Try one for yourself and see what I mean.

Conclusion

The LC4ELQ is hard to beat for return on your dollar investment for each watt of effective radiated power. The ease of assembly beats anything with spreaders. One fellow says he has built several and it now takes him much less time than the 45 minutes that he spent on the first. RF

This article is reprinted from the May 1983 issue of 73 Magazine.

Parts List		
Quantity	Description	Source
1	10-ft. piece of 3/4" schedule 40 PVC	Hardware store
1	3/4" PVC T-shaped fitting	Hardware store
2	1-1/2" hose clamp	Hardware store
3	1/4" x 2" bolt	Hardware store
3	1/4" nut	Hardware store
16	1/4" flat washer	Hardware store
2	#8 sheet-metal screws	Hardware store
2	#8 flat washer	Hardware store
27 feet	#8 aluminum ground wire	Radio Shack
35 feet	#12 monofilament fishing line	Sporting Goods

Solder and Soldering

by Joseph Crowling K4CPR

Soldering is one of the oldest and simplest methods of joining electronic components. Because of its simplicity and ease of application, it is often used but seldom studied or analyzed. It deserves more attention than amateurs give it. Murphy's law applies to soldering. If taken for granted, soldering can cause trouble.

Alloys

Soft solder, consisting mainly of tin and lead, is used for most electronic assembly. Soft solders make connections by virtue of a metal solvent action that takes place at low temperatures. The solvent action makes solder joints chemical in character rather than purely metallic.

Commercially available solders cover the entire range of tin-lead ratios from pure tin to pure lead. What is the best alloy for electronic assembly purposes? To answer this question, you have to remember that the primary purpose of solder is to connect two or more metals, but you also have to consider resistance to stress and strain, speed of alloy formation, flow and spread of the solder, and chemical stability of the joint. No one alloy meets all the requirements, but for electronic assembly a fairly

large range of alloys give good results.

Adding tin to lead lowers the melting point. An alloy of 63% tin and 37% lead has the lowest melting point (361 degrees F). It is known as the eutectic alloy. This alloy does not pass through a plastic state before it becomes molten. If more than 63% tin is added, the melting point temperature will begin to rise again. The best alloy for holding up under strain has about 60% tin and 40% lead. Alloys from 50-60% tin and 50-40% lead will give good results for most amateur needs.

Flux

All metals are covered with an oxide film. This film is nonmetallic and will prevent the metal solvent action (soldering) from taking place. Flux is added to the solder in order to remove the oxide film and allow the clean metal surfaces to make contact. The flux will remove only the oxides. It will not remove paint, dirt, or other foreign matter. The choice of proper flux is one of the most important steps in obtaining good solder joints. There are hundreds of different fluxes, but for the purpose of discussion, they will be divided into

four groups: (a) rosin, (b) activated rosin, (c) organic, and (d) acid.

Rosin flux gives good fluxing action. This flux is corrosive only when heated to a molten state. The corrosive action is needed to remove the oxides from the components being soldered. When the heat is removed, the residue left is noncorrosive and electrically nonconducting.

Activated rosin fluxes have a more effective fluxing action than pure rosin. They were developed to meet the demand for a faster, more efficient soldering process. The residues should be noncorrosive and nonconductive. Be careful when purchasing activated rosins; some of the advertising may be unclear.

Organic fluxes are more effective than rosin or activated rosin, but they leave corrosive residues. These fluxes are used when the fluxing action of rosins is insufficient and small amounts of corrosion may be tolerated. The residues should be removed.

Acid fluxes are the most effective, but they leave corrosive and electrically conductive residues. The word "acid" is a misnomer since the fluxes are actually salts. The residues absorb moisture from the air and the

corrosive action is probably due to galvanic or electrolytic action. These fluxes are used only when their great activity is needed. Kit manufacturers will not guarantee their kits if acid core solder is used.

The choice of a flux can be a complicated problem, but you will not go wrong if you choose the least active flux that will give good results for your particular application. For electronic assembly, pure rosin or some of the activated rosins would be the best choice.

Soldering

After the choice of a proper alloy and flux, good soldering becomes a function of the individual's technique. For good solder joints, the following must be observed:

1. Use the proper alloy and flux.
2. The soldering iron must be of sufficient wattage rating. (Don't try to use a 25 watt pencil iron to make a connection to a ground lug on a large aluminum chassis, and don't use a 125 watt gun type iron on a printed circuit board.) The iron should have a bright, smooth, tinned tip for most efficient heat transfer to the joint. Clean the tip periodically.
3. All elements of the joint should

be clean. (No dirt, paint, grease, or other foreign matter.)

4. Use the iron to heat the joint and apply the solder to the junction of the tip and the joint. Remove the iron when the solder wets the joint. Don't use excessive solder. The joint must not be jarred or subjected to vibration before the solder cools. Such motion will cause cold solder joints.

5. Inspect each joint. A properly made joint has a smooth appearance and a satin-like luster. Wiggling the components of the joint by hand, or with pliers, will also help make sure the joint is a good one.

Given the proper tools and a little experience, anyone can make good solder joints. Because of the simplicity of soldering, many people take it for granted and never bother to learn the fundamentals. Soldering is simple, but it can cause trouble. The failure of a solder joint acts the same as the failure of a component, but it can sometimes be much harder to find. Don't let a few cents of solder ruin the performance of hundreds of dollars of electronic equipment.

RF

This article was reprinted from the March 1966 issue of 73 Magazine.

BATTERIES

REPLACEMENT BATTERIES (ALL NEW—MADE IN USA)

NEW ICOM	
7S 13.2v 1200 mah	\$54.00
8S 9.6v 1200 mah	\$52.00
BP7 13.2v 600 mah	\$59.00
BP8 8.4v 1200 mah	\$59.00
SA/SAT	
BP82, BP83	
BP83A 7.2v 750 mah	\$40.00
BP84 7.2v 1000 mah 3"	\$40.00
BP85A 9.6v 600 mah 3"	\$69.00
BP85B 12v 600 mah 3"	\$69.00

KENWOOD	
PB1 12v 1000 mah	\$59.00
KNB4 7.2v 2200 mah	\$59.00
PB6 7.2v 750 mah	\$46.00
PB7 7.2v 1500 mah	\$55.00
PB8 12v 800 mah	\$49.00

MOTOROLA	
HT300 7.2v 1600 mah	\$45.00
HT90 12v 600 mah	\$34.00
HT440 12v 600 mah	\$39.00
MT500 15v 500 mah	\$39.00

RADIUS	
P-10 500 mah	\$28.00

SABER	
7.2v 1100 mah	\$59.00

SPECIALS
Holiday Sale
10% off all
Camcorder
and
Cellular Batteries

NEW ALINCO	
10N 7.2v 700 mah	\$32.00
12N 12v 700 mah	\$47.00
YAESU	
FNB4 12v 750 mah 4"	\$41.00
FNB4A 12v 1000 mah 4"	\$55.00*
FNB3A 9.6v 1200 mah 4"	\$45.00
*BASE CHARGE ONLY	

YAESU	
FNB-2 v 500 mah	
FNB-2 v 600 mah	
FNB-4A 12V 1000mah	\$55.00
FNB-17 7.2V 600mah	\$30.00
FNB-10S 7.2v 1000 mah	\$42.00
FNB-12S 12v 600 mah	\$45.00
290 charger	\$65.00
(For FNB 17,10S, 12S)	

ICOM	
AA Holder 8 NiCad or ALK AA	\$19.00
Side, top or base charge with 8AA Sanyo 600 NiCads	\$25.00
YAESU	
FNB-2 10.8V 600 mah	\$19.00
SANYO	
AA 600 mah	\$ 1.35

CALL FOR LOWEST PRICES	
ALINCO 10N, 12N	
AZDEN 3000, 4000	
ICOM BP-2, 3, 5, 7, 8, 7S, 8S	
KENWOOD PB-21, 21H, 25, 26	
REGENCY MT1000, HX1200	
SANTEC 142, 144	
STANDARD BP-1	
TEMPO S-1, 2, 4, 5, BP-15, S-15	
TEN TEC 2991, 2591	
UNIDEN (BEARCAT)	

CELLULAR	
MITSUBISHI	\$50.00
NEC	\$45.00
NOVATEL	\$45.00
PANASONIC	\$45.00
Bag Phone Kits	
MOTOROLA	
"FLIP" \$60.00	

CAMCORDER	
JVC	
PANASONIC	
PVBP80/88 12v 2.3 amps*	\$36.00
RCA/HITACHI	
Full size VHS-C	
SONY	
NP22	
NP55/77 2400 mah	\$39.00
ALL BRANDS AVAILABLE	
*original Panasonic	

*ALL BATTERY PACKS—GUARANTEED TO HAVE THE ADVERTISED CAPACITY

SEND FOR
FREE CATALOG

DEALER INQUIRIES
WELCOME

BATTERY-TECH, INC.

28-25 215 PLACE, BAYSIDE, N.Y. 11360 FAX 718-461-1978

800-442-4275 — N.Y.S. 718-631-4275



VISA



MASTER CARD



DISCOVER

CIRCLE 105 ON READER SERVICE CARD

letters

Continued from page 5

Novices, no-code Techs, and dummies that didn't grow up in electronics, but got into it at a later age, like myself! Keep up the good work. How about some more information about nets, code, and voice?

New subscribers who are also new hams will often receive one or two "double" issues. I hope all will follow your lead and share the extra copy with a potential new ham. David N1GPH

C.R. Cohouru "Coby" N3KLT I enjoy your paper very much. So far I have only a Kenwood

241A 2m and 450S/AT. I just got my license this spring at the age of 72, and do enjoy the hobby.

Don Vlack KB2KLP, Churchville NY I wanted to let you know that I just received my second issue of *Radio Fun* and eagerly read the whole thing from cover to cover, as I did the first issue.

I have been a ham for a little over a year, and although I upgraded quickly to General, I often feel as though I'm still a Novice, and the format of your magazine is terrific. So far, I think that you are fulfilling your goal.

Joel Levine's article alone is worth several times the subscription cost for the whole year. If you have just one article like that per issue, you can count on my subscription for several years to come.

My first station was picked up at the local hamfest just the way he describes. An old Heath DX-60 for the transmitter, and an old Hammarlund HQ-170 for the receiver. Well, I've upgraded to a Yaesu FT-101 transmitter (also hamfest purchased), but I'm still using the HQ-170. Although I've been lucky and had a good elmer to help me with the equipment choices, with the information in Joel's article, I'll feel much better going out on my own. There's still magic in those old rigs—as Mike Bryce says!

All of the articles are terrific, and I think that the ad ratio is OK. And yes, I am going to send in my reader service card. Once again, thanks for the great magazine.

Don, thanks for the nice letter. No matter what kind of gear you buy, that of DX-60 and HQ-170 will always be special to you. Keep them in good shape and someday you can have the joy of watching some young Novice make his first contact on the same rig. David N1GPH

Kenneth P. Long KF2BO, Rome NY Have read your Premier and September issues, and think the magazine is excellent. I offer the following suggestion for your consideration, given the orientation toward the newcomer: There is much literature on basic electronics, reading schematics, resistor and capacitor values, etc. However, practical advice is difficult to find for newcomers, and also for tube-era old-timers, on such things as: how to trouble-shoot; how to properly handle/install static-sensitive devices; how to test ICs and transistors for proper functioning; how to identify polarities of capacitors, LEDs, etc.; how to know when correct polarity orientation is critical; how to trouble-shoot one of the "simple" devices described in magazines after it is built, doesn't work, and construction seems to have been correct; and so on. The common advice seems to be to consult your elmer—but that isn't always possible or practical.

I think articles covering the above and similar subjects, or expansion of construction articles to do the same, would be of benefit to the newcomer, and those who could find their way around tube-type circuits but are baffled or nervous when confronted with a solid state circuit.

Kenneth, keep an eye on "The Tech Side" column in *Radio Fun* and "Ask Kaboom" if you get 73 Magazine. (If you have specific questions, drop a line to Michael Geier KB1UM, the columnist.) I, too, get a little nervous when sticking my nose into solid state gear. I'd sure like to see some articles submitted on this topic. In fact, some articles on finding your way around tube-type gear would be welcome. Writers? David N1GPH

Ken J. Harkcom KD4ELV, Tampa FL As a proud member of the Tampa Bay Amateur Radio Society for the past four months, I would like to advise you of a club project we are conducting that may be of interest to other clubs.

Our club president, Brian Lantz KD4BGH,

suggested that the club supply copies of our club newsletter, *QSP*, to local Radio Shack stores so that their customers and prospective hams could have a contact point to direct their questions about ham radio to. I made up a circular/flyer to insert into each newsletter with some general information on the hobby, the club, and members to contact for more information.

I am proud to announce that in the three weeks since this project started, I personally have had

TX I would like to congratulate you on the production of a fine magazine for the young and old ham or non-ham. I have enjoyed reading all issues from cover to cover, and find interesting ideas contained in each issue.

I would like to comment on a letter found in your issue number 3 from Dave Hockaday regarding the ARRL VE session that he attended with his wife. The situation in which she found herself after the 50-mile drive was not pleasant, I

am sure, and the VE in question could have handled the confrontation better; but he was half right according to my FCC rule book. I say he was half right because he should not have accepted the Novice written portion even if he had wanted to. Hockaday's wife passed her Novice written at a session overseen by two General class hams who could only send in a completed 610 form for the "standard" Novice license which consists of written and 5 wpm code. Since they were not operating a VE session, they could not issue her a CSCE. A CSCE is required for a VE to give credit for a previously taken element not covered in an existing license. Therefore, the VE had no way of accepting the Novice written portion as a completed element.

I think that the VE could have explained this to Mr. Hockaday and his wife at the time, and the problem would have been solved. I also think that a comment on your part after his letter would also have helped inform readers not fully aware of all aspects of the VE program. Our Novice classes specifically point out this situation when students are shown the difference between the code and no-code Tech licenses.

Sheryl Schuff KB9EGH, Indianapolis IN In answer to the question in the October 1991 *Radio Fun*, no, Cheickna S. Baber N4ZXA is not the youngest Extra class amateur in the U.S.

I don't think that should take anything away from this marvelous accomplishment, and the youth should receive everyone's congratulations and recognition. I'm sure that N4ZXA will be an inspiration to many hams of all ages.

I don't know for certain who is the youngest U.S. Extra, but one who is younger than N4ZXA is my son, Reuben Schuff AA9BY, formerly KB9EGP. Reuben passed his 20 wpm code test on June 15, 1991, Element 4A on July 20, 1991, and Element 4B on August 17, 1991, thereby qualifying for Extra class while he was still 9 years old. His 10th birthday was September 8, 1991.

I'd like to see more publicity on ALL the young hams, particularly those younger than high school age who have progressed to General class or above.

Sheryl—Thanks for your nice letter. When I was nine years old, I think I was still trying to figure out what the tooth fairy did with all those teeth! Congratulations to Reuben. David N1GPH

Bill Baker N5UMH, Norman OK Thanks for a nice publication. I really enjoy it. Good articles so far. Helpful and informative for a new ham, or for one who has been in it for a while, but who has not been able to spend as much time at the hobby as they would like.

I put together a 10m coaxial dipole, as described in the Sept. issue, the night before leaving for a few days' vacation in Colorado. With my Ranger, I worked stateside and Australia.

I might as well also use this as a sounding board for something irritating—Generals and higher class hams running well over 200 watts in the Novice section of the 10m band, and certainly not being bashful about it. With the standards required for licensing, the rather strict policies and operating attitudes demanded in amateur radio, I was surprised at this. It seems almost contradictory to the staunch, stoic attitudes that you find elsewhere in the hobby. RF

REMEMBER...A LOW COST POWER PACK WITHOUT PERIPHIX'S QUALITY IS NO BARGAIN

PERIPHIX POWER PACKS FOR LONGER QSO TIME



MADE FOR HAMS BY HAMS

NEW! SUPER PACKS FOR ICOM 2/4SAT & 24AT


BP-83	7.2V 600mah	\$33.50
BP-83S	7.2V 750mah	\$43.50
BP-84	7.2V 1000mah	\$57.00
BP-84S	7.2V 1400mah	\$63.00
BP-85S	12V 800mah	\$76.00

EXTENDED CAPACITY

SAVE ON THESE POPULAR PERIPHIX POWER PACKS

BP-7S	13.2V 1200mah	\$65.00
BP-8S	9.6V 1200mah	\$65.00

SAVE WITH THESE YAESU VALUES




FNB-4SH	12V 1000mah	\$71.00
FNB-14S	7.2V 1400mah	\$59.75
FNB-17	7.2V 600mah	\$35.00
FNB-12	12V 500mah	\$45.95
FNB-2	10.8V 500mah	\$22.50

"SEND FOR FREE CATALOG"

KENWOOD PERFORMANCE PLUS

BIG SAVINGS!

PB-25/26S	8.4V 900mah	\$65.00
PB-1	12V 1200mah	\$67.00
PB-8S	12V 800mah	\$59.00



Manufactured in the U.S.A. with matched cells, these Super Packs feature short circuit protection and overcharge protection, and a 12 month warranty. All inserts in stock or available from authorized dealers. CALL US TO DISCUSS YOUR BATTERY REQUIREMENTS.



Add \$4.00 Shipping & Handling. Connecticut residents add 8% tax.

PERIPHIX Inc.

115-1B Hurley Rd., Oxford, CT 06478

800-634-8132

In Connecticut 203-264-3985 - FAX 203-262-6943

CIRCLE 68 ON READER SERVICE CARD

AMATEUR RADIO

Tampa Bay Amateur Radio Society
P.O. Box 172533
Tampa, Florida 33672-2533

YOU CAN BE A HAM!

IT'S NEVER BEEN EASIER OR MORE FUN... THE NEW NO-CODE TECHNICIAN LICENSE IS NOW AVAILABLE WITHOUT THE NEED TO LEARN MORSE CODE, AND GRANTS YOU THE PRIVILEGES OF ALL THE AMATEUR RADIO BANDS ABOVE 30 MHz, INCLUDING THE POPULAR 2 METER BAND, THE 10M BAND, TV (ATV) AND AMATEUR SATELLITE BANDS.

IF YOU WOULD LIKE TO JOIN THE FRIENDLY AND GROWING FRATERNITY OF AMATEUR RADIO OPERATORS, PARTICIPATE IN PUBLIC SERVICE EVENTS, EMERGENCY & DISASTER COMMUNICATIONS, AND BE PART OF NEW & EXCITING TECHNOLOGICAL ADVANCES IN THE COMMUNICATIONS FIELD, THEN TBARS CAN HELP YOU ENTER THE EXCITING WORLD OF AMATEUR RADIO.

TBARS (TAMPA BAY AMATEUR RADIO SOCIETY) CAN PROVIDE YOU WITH THE INFORMATION YOU NEED TO BECOME A HAM INCLUDING TBARS SPONSORED NOVI-VE LICENSE TESTING SESSIONS ON THE LAST THURSDAY OF EVERY MONTH AT 7:30 PM. AND LICENSE PREPARATION CLASSES. TBARS MONTHLY MEETINGS ARE OPEN TO THE PUBLIC AS WELL AS ALL LICENSED HAMs, NOVICEs AND NON-MEMBERS. WHY NOT JOIN US AT THE NEXT MEETING, ASK QUESTIONS, PARTICIPATE IN THE MONTHLY SEMINAR, AND JUST ENJOY THE FELLOWSHIP OF YOUR HAM NEIGHBORS.

HAVE A SEAMEN? MONITOR THE TBARS WEEKLY NET ON THURSDAY EVENINGS AT 7:30 PM ON 147.105 MHz AND THE TBARS VOICE PACKET NET ON THE THIRD THURSDAY AT 7:30 PM ON 147.105 MHz.

FOR MORE INFORMATION ON TBARS OR ANSWERS TO YOUR QUESTIONS ABOUT AMATEUR RADIO CONTACT:

KEN HANCOCK (K4EVL) (813) 977-6182	JIM BUSCHMACHER (N4M2) (813) 699-3006
BRIAN LANTZ (KD4BGH) (813) 877-1469	ARLIE HILBACH (K00C2) (813) 906-6352

TBARS MONTHLY MEETING
EVERY SECOND THURSDAY AT 7:30 PM
RED CROSS BUILDING
214 N. HOWARD AVENUE
TAMPA, FLORIDA

TALK-IN FREQUENCY: 147.105 MHz

FIG. ST.
NORTH A ST.
KENNEDY BLVD.

TBARS

COME JOIN THE FUN

Do you want to make a flyer to promote interest in amateur radio and attract new club members? TBARS's flyer can serve as an excellent model to start the ideas flowing. Clear, direct, and informative, TBARS's flyer has everything.

over 43 phone calls from people wanting information on becoming hams, including three who called back to tell me that they had passed their exams (one Novice, one Tech-Plus, and one Tech-Lite).

The Radio Shack managers welcomed me with open arms, several stating that they had had many questions on ham radio from their customers in the past, but had no contact sources to refer them to. Several also asked for extra copies of the flyer to post on their front windows, and for their display of their new 2 meter rig available October 17.

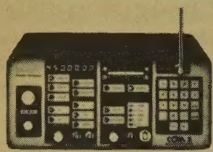
Due to the response TBARS has had in only three weeks, I highly recommend this project to all amateur radio clubs. The flyers can be sent to schools, electronic shops, etc., and made available at club sponsored events such as Field Day, NTS traffic booths, public service events, etc., and the extra copies of club newsletters won't just sit on a shelf somewhere.

Thank you for this opportunity to let you know that amateur radio clubs don't have to be boring and limited only to those who can show three burns from vacuum tubes! TBARS has a guest speaker at each monthly meeting, and several of the topics scheduled for future meetings include: NTS traffic handling, packet operations and BBSs, weather and how amateur radio can help in local disasters and warning systems such as SKY-WARN, proper grounding of amateur radio stations, and local electrical codes unique to amateur stations (presented by electric company representatives), and a discussion on how amateur radio differs in Europe (presented by a recent transplant from England).

Readers: See the copy of TBARS's excellent flyer, reproduced in this "Letters" department. It can give you some good ideas about designing your own. Linda KA1UKM

Jeffrey C. Montgomery WB4WXD, Palestine

RAMSEY ELECTRONICS



COM-3
\$279500

2 WAY RADIO SERVICE MONITOR

COM-3, the world's most popular low-cost service monitor. For shops big or small, the COM-3 delivers advanced capabilities for a fantastic price—and our new lease program allows you to own a COM-3 for less than \$3.00 a day. Features •Direct entry keyboard with programmable memory •Audio & transmitter frequency counter •LED bar graph frequency/error deviation display •0.1–10,000 µV output levels •High receive sensitivity, less than 5 µV •100 kHz to 999.9995 MHz •Continuous frequency coverage •Transmit protection, up to 100 watts •CTS tone encoder, 1 kHz and external modulation.



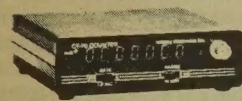
RSG-10
\$249500

SYNTHESIZED SIGNAL GENERATOR

Finally, a low-cost lab quality signal generator—a true alternative to the \$7,000 generators. The RSG-10 is a hard working, but easy to use generator ideal for the lab as well as for production test. Lease it for less than \$3.00 a day. Features •100 kHz to 999 MHz •100 Hz resolution to 500 MHz, 200 Hz above •–130 to +10 dBm output range •0.1 dB output resolution •AM and FM modulation •20 programmable memories •Output selection in volts, dB, dBm with instant conversion between units •RF output reverse power protected •LED display of all parameters—no analog guesswork!

FREQUENCY COUNTERS

CT-70 7 DIGIT 525 MHz



CT-90 9 DIGIT 600 MHz



CT-125 9 DIGIT 1.2 GHz



Ramsey Electronics has been manufacturing electronic test gear for over 10 years and is recognized for its lab quality products at breakthrough prices. All of our counters carry a full one-year warranty on parts and labor. We take great pride in being the largest manufacturer of low-cost counters in the entire U.S.A. Compare specifications. Our counters are full-featured, from audio to UHF, with FET high impedance input, proper wave shaping circuitry, and durable high quality epoxy glass plated-thru PC board construction. All units are 100% manufactured in the U.S.A. All counters feature 1.0 ppm accuracy.

NEW CT-250 2.5 GHz

ACCESSORIES FOR COUNTERS

Telescopic ship antenna—BNC plug, WA-10 \$11.95
High impedance probe, light loading, HP-1 \$16.95
Low-pass probe, audio use, LP-1 \$16.95
Direct probe, general purpose use, DC-1 \$16.95
Tilt bail, elevates counter for easy viewing, TB-70 \$9.95
Rechargeable internal battery pack, BP-4 \$9.95
CT-90 oven timebase, 0.1 ppm accuracy, OV-1 \$9.95

ALL COUNTERS ARE FULLY WIRED & TESTED

MODEL	FREQ. RANGE	SENSITIVITY	DIGITS	RESOLUTION	PRICE
CT-50	20 Hz–600 MHz	< 25 mV to 500 MHz	8	1 Hz, 10 Hz	\$189.95
CT-70	20 Hz–550 MHz	< 50 mV to 150 MHz	7	1 Hz, 10 Hz, 100 Hz	\$139.95
CT-90	10 Hz–600 MHz	< 10 mV to 150 MHz < 150 mV to 600 MHz	9	0.1 Hz, 10 Hz, 100 Hz	\$169.95
CT-125	10 Hz–1.25 GHz	< 25 mV to 50 MHz < 15 mV to 500 MHz < 100 mV to 1 GHz	9	0.1 Hz, 1 Hz, 10 Hz	\$189.95
CT-250	10 Hz–2.5 GHz typically 3.0 GHz	< 25 mV to 50 MHz < 10 mV to 1 GHz < 50 mV to 2.5 GHz	9	0.1 Hz, 1 Hz, 10 Hz	\$239.95
PS10B Prescaler	10 MHz–1.5 GHz, divide by 1000	< 50 mV	Convert your existing counter to 1.5 GHz		\$89.95



SPEEDY
SPEED RADAR
\$89.95
complete kit
SG-7

New low-cost microwave Doppler radar kit "clocks" cars, planes, boats, horses, bikes or any large moving object. Operates at 2.6 GHz with up to 1/4 mile range. LED digital readout displays speed in miles per hour, kilometers per hour or feet per second! Earphone output allows for listening to actual doppler shift. Uses two 1-lb coffee cans for antenna (not included) and runs on 12 VDC. Easy to build—all microwave circuitry is PC stripline. Kit includes delivery. ABS plastic case with speedy graphics for a professional look. A very useful and full-of-fun kit.

BROADBAND PREAMP

Boost those weak signals to your scanner, TV, shortwave radio or frequency counter. Flat 25 dB gain, 1 to 1000 MHz, 3 dB NF. BNC connectors. Runs on 12 VDC or 110 VAC. PR-2, wired, includes AC adapter \$59.95

2M POWER AMP

Easy to build power amp has 8 times power gain, 1W in, 8W out, 2W in, 16W out, 5W is for 40W out. Same amp as featured in many ham magazine articles. Complete with all parts, less case and T-R relay. PA-1, 40W pwr amp kit \$29.95
TR-1, RF sensed T-R relay kit \$8.95

FM WIRELESS MIKE KITS

Pick the unit that's right for you. All units transmit stable signal in 88–108 MHz FM band up to 300' except for hi power FM-4 that goes up to 1/2 mile.
FM-1, basic unit \$5.95
FM-2, as above but with added mike preamp \$7.95
FM-4, long range, high power with very sensitive audio section, picks up voices 10' away \$14.95
FM-3, complete unit includes case, battery, switch, antenna, and built-in condenser mike. Excellent fidelity, very small, kit \$16.95
FM-3WT, as above, but fully wired and tested \$19.95
SMC, miniature sensitive mike cartridge for FM-1, 2, 4 \$2.95

FM-3
SHOWN

MICROWAVE INTRUSION ALARM

A real microwave Doppler sensor that will detect a human as far as 10 feet away. Operates on 1.3 GHz, and is not affected by heat, light, or vibrations. Drives up to 100 mA output, normally open or closed, runs on 12 VDC. Complete kit MD-3 \$16.95

MUSIC MACHINE

Neat kit that will produce 25 different classical and popular tunes, plus 3 doorchime sounds. Lots of fun for doorbells, shop, or store entrances, car horn, music boxes, etc. Runs on 9V battery or wall transformer. Excellent speaker volume and adjustable tempo and pitch. Add our case set for a handsome finished look. Complete kit, MM-5 \$24.95
Case + knob set, CMM-5 \$12.95

PACKET RADIO

Commodore C64/128 packet radio interface. Uses famous German Digicom software. Features EXAR IC chip set for reliable operation—runs HF or VHF tones. Includes FREE disk software, PC board, all necessary parts and full documentation. Complete kit, PC-1 \$49.95

LO NOISE PREAMPS

Make that receiver come ALIVE! Small size for easy installation with Hi-Q tuned input for peak performance. Excellent gain and noise figure—guaranteed to improve reception! Specify band: 2M—PR-10, 220 MHz—PR-20, 440 MHz—PR-40. Each kit \$17.95

TONE DECODER

A complete tone decoder on a single PC board. Features: 400–5000 Hz adjustable range via 20-turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts. Complete kit, TD-1 \$5.95

VOICE ACTIVATED SWITCH

Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED, or even a tape recorder motor. Runs on 9 VDC. VS-1 kit \$6.95

TELEPHONE TRANSMITTER

Mini-sized with professional performance. Self-powered from phone line, transmits in FM broadcast band up to 1/4 mile. Installs easily anywhere on phone line or inside phone! PB-1 kit \$14.95

NEW

SPEAKER PHONE

Talk on the phone hands-free, to answer to put in shop or shack, press the button to transmit—no actual phone needed. Works same as commercial units. Talk from anywhere in room, phone line powered—no battery needed. Super for family and conference calls or buy two for hands-free intercom! Add our case set for a pro look. SP-1 \$29.95 Case-CSP \$12.95

TICKLE STIK

A shocking kit! Blinking LED attracts victims to pick up innocent-looking can—you watch the fun! Ideal for office desks, parties, nousey know-it-alls! TS-4 kit \$9.95

LIGHT BEAM COMMUNICATORS

Transmits audio over infrared beam up to 30'—use simple lenses to go up to 1/4 mile! Hum free, uses 30 kHz carrier. Great for wireless earphones or undetectable "bug." Transmitter + receiver set, LB56 \$19.95

FM RADIO

Full-fledged superhet, microvolt sensitivity, IC detector and 10.7 MHz IF. Tunes Std. FM broadcast band as well as large portions on each end. Ideal for "bug" receiver, hobby experiments or even as FM radio! FR-1 kit \$14.95

SUPER SLEUTH

A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2W rms output. Runs on 6 to 15 volts, uses 8–45 ohm speaker. BN-9 kit \$5.95

BROADBAND PREAMP

Very popular sensitive all-purpose preamp, ideal for scanner, TVs, VHF/UHF rigs, counters. Lo noise, 20 dB gain, 100 kHz–1 GHz, 9V–12 VDC operation. SA-7 kit \$14.95



FANTASTIC 2M FM TRANSCEIVER SYNTHESIZED—NO CRYSTALS TO BUY!



\$149⁹⁵

Ramsey breaks the price barrier on 2 meter rigs! Here's the ideal rig for field days, hamfests, vacations, second cars and packet (it even has dedicated packet connections). Six expandable diode-programmed channels, 5W RF output, sensitive dual conversion receiver and EASY assembly. Why pay more for a secondhand old rig when you can make your own for less. Have some fun with your own truly AMERICAN-MADE FM rig! This kit comes complete except for the case, mike and speaker—ICOM or equal speaker-mikes plug right in. Add our own beautiful case set for a professional factory look.

FTR-146 kit \$149.95
FTR-146-C metal case & knob set \$24.95

2 MTR & 220 BOOSTER AMP

Here's a great booster for any 2 meter or 220 MHz hand-held unit. These power boosters deliver over 30 watts of output, allowing you to hit the repeater's full quieting while the low noise preamp remarkably improves reception. Ramsey Electronics has sold thousands of 2 meter amp kits, but now we offer completely wired and tested 2 meter, as well as 220 MHz, units. Both have all the features of the high-priced boosters at a fraction of the cost.
PA-10 2 MTR POWER BOOSTER (10 X power gain)
Fully wired & tested \$79.95
PA-20 220 MHz POWER BOOSTER (8 X power gain)
Fully wired & tested \$79.95



QRP TRANSMITTERS HAM RECEIVERS

20, 30, 40, 80M CW TRANSMITTERS



Join the fun on QRP! Thousands of these mini-rigs have been sold and tons of DX contacts have been made. Imagine working Eastern Europe with a \$30 transmitter—that's ham radio at its best! These CW rigs are ideal mates to the receivers at right. They have two-position variable crystal control (one popular QRP XTAL included), one watt output and built-in antenna switch. Runs on 12VDC. Add our matching case and knob set for a handsome finished look.
Your choice of bands \$29.95
(Specify band: QRP-20, 30, 40 or 80)
Matching case & knob set, CQRP \$12.95

20, 30, 40, 80M All Mode RECEIVERS

Build your own mini ham station. Sensitive all-mode AM, CW, SSB receivers use direct conversion design with NE602 IC as featured in QST and ARRL handbooks. Very sensitive varactor tuned over entire band. Plenty of speaker volume. Runs on 9V battery. Very EASY to build, lots of fun and educational—ideal for beginner or old pro. New 30-page manual. Add the case set for well-fitted professional look.
Your choice of bands \$27.95
(Specify band: HR-20, HR-30, HR-40, HR-80)
Matching case & knob set, CHR \$12.95

E-Z KEY CMOS KEYS

Send perfect CW within an hour of receiving this kit! Easy-to-build kit has sidetone oscillator, speed control and keys most any transmitter. Runs for months on a 9V battery. 28-page manual gives ideas on making your own key for extra savings. Add our matching case set for complete station look.
CW-7 kit \$24.95
Matching case knob set, CCW \$12.95

ACTIVE ANTENNA

Cramped for space? Get longwire performance with this desktop antenna. Properly designed unit has dual HF and VHF circuitry and built-in whip antenna, as well as external jack. RF gain control and 9V operation makes unit ideal for SWLs, traveling hams or scanner buffs who need hotter reception. The matching case and knob set gives the unit a hundred dollar look!
AA-7 Kit \$24.95
Matching case & knob set, CAA \$12.95

SPEECH SCRAMBLER

Communicate in total privacy over phone or radio. Kit features full duplex operation using frequency inversion. Both mike and speaker or line in/out connections. Easy hookup to any radio, and telephone use requires no direct connection! Easy to build 2 IC circuit. Can also be used to descramble many 2-way radio signals. Finish your kit off with the handsome case & knob set.
SS-7 kit \$29.95
Matching case & knob set, CSS \$12.95

SHORTWAVE RECEIVER



Fantastic receiver that captures the world with just a 12" antenna! Can receive any 2 MHz portion from 4–11 MHz. True superhet has smooth varactor tuning, AGC, RF gain control, plenty of speaker volume and runs on a 9V battery. Fascinating Scout, school or club project provides hours of fun for even the most serious DXer. For the car, consider our shortwave converter. Two switchable bands (in 3–22 MHz range), each 1 MHz wide—tunable on your car radio dial. Add some interest to your drive home!
Shortwave receiver kit, SRI \$27.95
Shortwave converter kit, SCI \$24.95
Matching case set for SRI, CSR \$12.95
Matching case set for SCI, CSC \$12.95

Keep an ear on the local repeater gang, monitor the cops, check out the weather or just plain listen around. These sensitive superhet receivers are just the ticket. They tune any 5 MHz portion of the band and have smooth varactor tuning, dual conversion with ceramic IF filters, AFC, adjustable squelch and plenty of speaker volume. Runs on 9V battery and performance that rivals the big rigs! For a complete finished pro look, add our matching case and knob set with screened graphics.
FM communications receiver kit \$29.95
Specify band: FR 146 (2m), FR6 (6m), FR10 (10m), FR-220 (220 MHz)
Matching case & knob set, CFR \$12.95

FM STEREO TRANSMITTER

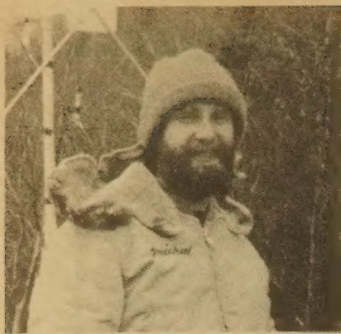
Run your own stereo FM station! Transmit a stable signal in the standard FM broadcast band throughout the house, dorm or neighborhood. Connects easily to line outputs on CD player, tape decks, etc. Runs on 9V battery, has internal whip antenna and external antenna jack. Add our case set for a "station" look!
FM-10 kit \$29.95
Matching case set, CFM \$12.95

AIRCRAFT RCVR

Hear exciting aircraft communications—pick up planes up to 100 miles away! Receives 110–136 MHz AM air band, smooth varactor tuning superhet with AGC, ceramic filter, adjustable squelch, excellent sensitivity and lots of speaker volume. Runs on 9V battery. Great for air shows or just hanging around the airport! New 30-page manual details pilot talk, too. Add case set for "pro" look.
AR-1 kit \$24.95
Matching case set, CAR \$12.95

PHONE ORDERS CALL
716-924-4560
FAX 716-924-4555

RAMSEY ELECTRONICS, INC. 793 Canning Parkway, Victor, NY 14564



the tech side

by Michael Jay Geier KBIUM

Ask Away

This time, we're going to take a detour from our discussion of building and fixing, thanks to a letter to the editor from Bob Williams KA7VJD, which appeared in the October issue. Bob had some pretty good suggestions and questions. Let's look at a few now.

Bob suggested that we start a question and answer column. Well, folks, that's what I'm here for! From the beginning, this column was intended to serve as a forum to help answer your technical questions and try to solve your troubleshooting problems. I'm not an antenna maven, nor am I an expert on propagation or contesting. My specialty is circuitry, and solid-state circuitry in particular. I can also help with theory, from basics like Ohm's law on up to hairier things like phase-locked loops. So, ask away! Write to me in care of *Radio Fun* and the editors will forward your letters to me. One thing, though: Like most of you, I'm usually rather pressed for time, and I just can't answer letters directly. I'll do my best to get appropriate stuff into this column, but please

save your stamps and SASEs. Thanks.

Bob specifically mentioned that he really couldn't explain the various kinds of modulation, like USB, LSB, FM, etc. Bob, you're not alone! From what I hear on the air, that topic is the center of much confusion, misinformation and rumor. What say we take a look at it now?

Going Through Changes

Modulation is the process by which we impress intelligence (our message) upon a radio signal in order to get the message to someone else. Let's face it, a plain, steady carrier is mighty boring to listen to! There are lots of types of modulation, but they can be roughly categorized into two major groups: amplitude and frequency. Let's look at the various kinds of amplitude modulation first.

Amplitude modulation includes good ol' AM, CW (Morse code) and also SSB (single sideband). In CW, the carrier, which is just a sinewave at a frequency high enough for radio propagation, is turned on and off by your key. Really, it should be called Interrupted Wave! It was called Continuous Wave to distin-

guish it from spark transmissions, in which the carrier died out during each dit or dah (that was called "Damped Wave"), and the name has stuck ever since. In AM, the carrier has its amplitude (size or power) made bigger and smaller in step with the audio signal corresponding to your voice. Because the frequencies in the voice signal are many times slower than that of the carrier, each voice "wave" modulates many carrier waves. So, from one carrier wave to the next, there doesn't appear to be much change, but there is some. More about that in a minute.

Once upon a time, in the very early days of radio, there was great debate as to whether an intelligence-bearing radio signal (in other words, one which was modulated in some way) could exist at a single frequency or might occupy a band of frequencies. On an actual receiver, it seemed to occupy a "bandwidth," but the effect was attributed by many people to the lack of selectivity (or "narrowness") of their receivers. And, they pointed out, CW Morse code, which was the prevalent mode in those days, obviously couldn't have any band-

width because it was either on or off. When it was on, it was just an unmodulated carrier and when it was off, it wasn't there at all! All in all, the "widthless" theory was very attractive because it suggested that an infinite number of stations could share any band if only the receivers could be made selective enough.

Any pessimist could've set 'em straight! Real life just doesn't work that way, and radio is no exception. Mathematical analysis proved once and for all that signals did indeed occupy a bandwidth. Further, that bandwidth was directly related to the frequencies modulating the carrier and it was predictable. Before we go on with this, let me answer the obvious question: When the CW Morse code signal is on, it has no bandwidth. Obviously, when it is off, it has none either. But at the instant it turns on and off, it *does* have bandwidth, and the faster you send the dits and dahs, the greater that bandwidth. Clever, huh?

The math also proved that the only wave which contains energy only at its fundamental, or obvious, frequency is a perfect sinewave. Any other shape of wave will have some energy at other frequencies. Imagine a bunch of perfect, pretty sinewaves. Now imagine that we are gradually making them bigger and smaller with our modulation. Clearly, some of them will have their beginnings bigger or smaller than their endings. In other words, they aren't perfect sinewaves anymore! In a sense, modulation is *distortion*, at least from the carrier's point of view. And, if you have imperfect sinewaves, you have some energy at other frequencies. As it turns out, those frequencies will be offset from the carrier frequency by exactly the same amount

as the modulating frequencies. Thus, if you modulate a 14.000 MHz (megahertz) signal with a 3 kHz (kilohertz) tone, you get energy which extends from 14.000 MHz to 14.003 MHz. The 3 kHz adds to it! Wait, it gets worse. You *also* get energy down to 13.997 MHz, because the frequencies subtract as well as add. What a mess!

Ultimately, it works out like this: Because the frequencies add and subtract as the cycles swing back and forth, the energy at the carrier frequency goes neither up nor down; it just sits there. The energy in the sidebands, however, goes up and down with the modulation, and the amount of energy is split evenly between the upper and lower sidebands. Each sideband winds up with one-quarter of the transmitter's total output, and the carrier, which carries no intelligence at all, gets one-half.

So, if you think about it, only one-quarter of the transmitter power is really being used to convey your message, with another quarter duplicating the effort and a full one-half doing nothing at all! Also, the total bandwidth taken up by your station is twice the original modulating frequency, and twice as wide as it really needs to be. If that seems wasteful to you, you're right! Early on, hams, whose output power and band space were limited by law and economics, looked for a more efficient scheme. They found one. It's called Single Sideband (SSB).

Off with Their Sidebands

If only one sideband actually does anything, it seems logical to put all the transmitter power into that and scrap the rest. Logical, yes. Easy, no. The add-

DUAL BAND

146/446 MHz
No Tuning Required
18 inches Tall, All Black
Noiseless Spring
Preserves the sleek look of your vehicle
Performance Equals or exceeds a 5/8 wave on VHF or Collinear on UHF
\$29.95 + shipping
Accessories Available
30 Day money back guarantee
We like this antenna and the way it operates so well, that we are willing to offer a warranty that is almost unheard of in the amateur radio market today. If in the first 30 days you are not satisfied with the way this antenna operates, return the antenna in good condition, postage paid and we will refund to you the \$29.95 purchase price.

D & L FABRICATION

P.O. Box 6784, Leawood, Kansas 66206
06:00 PM to 08:00PM
Information: 1-913-677-4766
Order Line: 1-800-533-5160

CIRCLE 29 ON READER SERVICE CARD

Sold the Linear?

That's right. Never been happier, either. It all started when I wanted to crash the DX party on 40 CW. First I put up a HalfSquare aiming NE. I found I could work Europeans barefoot when the rotary beam KWs couldn't even hear 'em. So I put up another aimed NW, sold the linear, and bought the YL a new coat. Best trade I ever made. When you order add \$5 P&H.

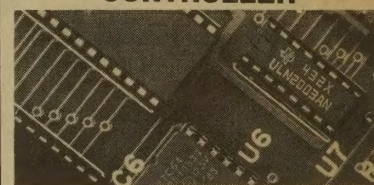
10 M	15 M	20 M	40 M
\$39.95	\$44.95	\$49.95	\$69.95

Antennas West
Box 50062F, Provo, UT 84605
Plans, patterns, technical details in TechNote #122B \$5.95 ppd USA.

CIRCLE 89 ON READER SERVICE CARD

**Contact Advertisers Easily
Use your Reader Service Card**

SRC-10 REPEATER/LINK CONTROLLER

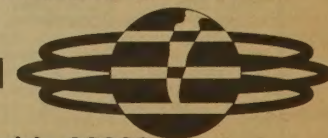


DTMF muting
Intelligent ID'er
Auxiliary outputs
Easy to interface
Alarm monitor input
Telemetry response tones
Low power CMOS, 22ma @ 12v
Detailed application manual
Programmable COS polarities
Repeater & link courtesy tones
Synthesized link/remote base capability
\$149.00 Assembled & Tested
CREATIVE CONTROL PRODUCTS
3185 Bunting Avenue
Grand Junction, CO 81504
(303) 434-9405

CIRCLE 146 ON READER SERVICE CARD

Maxcom®

**"The ONLY, Absolutely, Completely,
Fully, No Adjustment, Install It,
Forget It, Works Even in Receive,
All Frequency, Tougher than
Lightning, Works Forever, Waterproof,
Automatic Antenna Matcher"!!!**



**OVER 7,000 MAXCOM® STATIONS WORLDWIDE
THE BOTTOM LINE: "MAXCOM® WORKS".**

P.O. Box 502
Fort Lauderdale • Florida 33302
Phone: 305-523-6369 • Fax: 305-522-8159

ing/subtracting process of AM is a natural part of the process, and getting it to go in only one direction is a bit tricky. Nonetheless, hams were experimenting with SSB in the fifties and it was in common use by the mid-sixties.

There are several methods of producing SSB, but the one most commonly used today is a simple filtering process. A technique known as "balanced modulation" permits the generation of a signal with two sidebands but no carrier. This is called a "suppressed carrier" signal. Believe it or not, you can do that with just four diodes! The harder part is getting rid of the other sideband. The signal is passed through a very narrow filter. The filter passes the sideband whose frequencies fall within its frequency range (known as the "passband") and rejects the other sideband (because it is not in the passband). Voilà, SSB! By selecting which frequencies are passed and rejected, either sideband can be passed. In upper sideband (USB), the sideband above the absent carrier's frequency is passed, while in LSB the one below it is passed.

Quack Quack

If you've ever listened to SSB on an AM receiver, you know what I mean when I say it sounds like Donald Duck. You can tell that it's someone talking, but you can't make out what the sender is saying. Why not?

Well, when you chop off the carrier signal, you are altering the wave shapes of the transmitted signal, and this causes a peculiar distortion of the received signal *if it is processed by a receiver not intended for it*. In other words, the intelligence no longer corresponds exactly to the envelope (overall strength changes) of the signal, and AM receivers use envelope detectors to decode the signal into audio. (See, that carrier was sort of doing something all along, by acting as a kind of "reference" signal!) To recover the original signal, it is necessary to reintroduce a fake carrier signal. Mixing it with the SSB signal results in a signal which is just like regular AM, except that one sideband is missing. Luckily, that doesn't matter, and the resultant signal can be processed just like any AM signal.

Transmitting without a carrier signal causes some interesting side effects. For one, interfering stations do not cause "heterodynes," or whistling tones, in the receiver because there are no carriers to mix with each other. Also, an effect called "selective fading," wherein atmospheric fading affects the two sidebands by different amounts (and causes terrible distortion) is eliminated, because there is only one sideband. You know how AM shortwave broadcast stations get that horrible distortion as they fade in and out? You won't hear it on SSB.

Another effect: The pitch of the voice changes as you tune across an SSB station because your fake carrier, which is the pitch reference, does not change with your tuning. For this reason, SSB receivers need great frequency stability, and are unsuitable for music, which requires very accurate pitch detection.

Finally, the best effect is that an SSB signal is much louder than an equivalent-power AM signal would be, because all the power represents your message.

Tradition

If you've operated HF SSB, you've noticed that we use USB on 20 meters and up, and LSB on 40 meters and down.

Why? What could the frequency have to do with which sideband we use? In fact, why not just use one sideband all the time?

The answer is that you're right! The frequency has nothing to do with the chosen sideband. Radio, however, is evolutionary. At one time, components were expensive and radio designers tried to get as much functionality from as few parts as possible. One popular multi-band scheme saved the cost of several

crystals but had the side effect that the sidebands got reversed on 40 and 75 meters. So many radios were made that way that it became conventional to use those sidebands on those bands. Heck, you had to because everyone else did! So, even though today's rigs can switch sidebands with ease, we continue to use the old scheme out of tradition and habit. In some countries, sideband selections are mandated by law, but not here in the good old U.S.A.

By the way, although the telephone company had been using it over landlines, hams were the first to successfully apply SSB to radio transmission, which was more difficult. Eventually, they convinced the military to try it in airplanes. Not wanting to spend lots of money for the test, the armed forces took ham gear and modified it to their own frequencies. It was a great success, and today SSB is the primary mode in military aircraft. See, we hams are good

for something besides putting wavy lines on the neighbors' TV sets!

Well, we've lots more to discuss; we haven't even touched on FM! But I'm out of room for this month, so we'll continue this next time. 'Till then, 73 from KB1UM.

RF

Contact Michael Geier KB1UM care of Radio Fun, Forest Rd., Hancock NH 03449.



9 Autry
Irvine, CA 92718
(714) 458-7277

MODEL VS-50M

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mV peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

SL SERIES	Colors	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
MODEL SL-11A	Gray • Black •	7	11	2 1/4 x 7 1/8 x 9 3/4	11
RS-L SERIES		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
MODEL RS-4L		3	4	3 1/2 x 6 1/8 x 7 1/4	6
MODEL RS-5L		4	5	3 1/2 x 6 1/8 x 7 1/4	7
RM SERIES		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
MODEL RM-12A		9	12	5 1/4 x 19 x 8 1/4	16
MODEL RM-35A		25	35	5 1/4 x 19 x 12 1/2	38
MODEL RM-50A		37	50	5 1/4 x 19 x 12 1/2	50
MODEL RM-60A		50	55	7 x 19 x 12 1/2	60
RS-A SERIES	Colors	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
MODEL RS-3A	Gray • Black •	2.5	3	3 x 4 1/4 x 5 1/4	4
MODEL RS-4A	• •	3	4	3 3/4 x 6 1/2 x 9	5
MODEL RS-5A	• •	4	5	3 1/2 x 6 1/8 x 7 1/4	7
MODEL RS-7A	• •	5	7	3 3/4 x 6 1/2 x 9	9
MODEL RS-7B	• •	5	7	4 x 7 1/2 x 10 3/4	10
MODEL RS-10A	• •	7.5	10	4 x 7 1/2 x 10 3/4	11
MODEL RS-12A	• •	9	12	4 1/2 x 8 x 9	13
MODEL RS-12B	• •	9	12	4 x 7 1/2 x 10 3/4	13
MODEL RS-20A	• •	16	20	5 x 9 x 10 1/2	18
MODEL RS-35A	• •	25	35	5 x 11 x 11	27
MODEL RS-50A	• •	37	50	6 x 13 3/4 x 11	46
RS-M SERIES		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
MODEL RS-12M		9	12	4 1/2 x 8 x 9	13
MODEL RS-20M		16	20	5 x 9 x 10 1/2	18
MODEL RS-35M		25	35	5 x 11 x 11	27
MODEL RS-50M		37	50	6 x 13 3/4 x 11	46
VS-M AND VRM-M SERIES		Continuous Duty (Amps) @13.8VDC @10VDC @5VDC	ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt. (lbs.)
MODEL VS-12M		9 5 2	12	4 1/2 x 8 x 9	13
MODEL VS-20M		16 9 4	20	5 x 9 x 10 1/2	20
MODEL VS-35M		25 15 7	35	5 x 11 x 11	29
MODEL VS-50M		37 22 10	50	6 x 13 3/4 x 11	46
VRM-35M		25 15 7	35	5 1/4 x 19 x 12 1/2	38
VRM-50M		37 22 10	50	5 1/4 x 19 x 12 1/2	50
RS-S SERIES	Colors	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
MODEL RS-7S	Gray • Black •	5	7	4 x 7 1/2 x 10 3/4	10
MODEL RS-10S	• •	7.5	10	4 x 7 1/2 x 10 3/4	12
MODEL RS-12S	• •	9	12	4 1/2 x 8 x 9	13
MODEL RS-20S	• •	16	20	5 x 9 x 10 1/2	18

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

CIRCLE 16 ON READER SERVICE CARD

TigerTail™

Range Extender for 2 meter Handheld Radios

- Boosts Signal from Flex & 1/4 wave Antennas
- Lowers Radiation Angle
- Improves both Receive and Transmit
- Raises Low Power Performance
- Saves your Battery Pack

Patent Pending Infopak \$1

See and Hear the Difference

1-800-926-7373
Order Hotline

7.95
ppd

CIRCLE 138 ON READER SERVICE CARD

from AntennasWest
Box 50062F, Provo, UT 84605
1-801 373 8425

- Easy to Use
- Snaps on Handheld
- Unobtrusive
- Easily Concealed
- Adds No Bulk or Height
- Weighs only 1/3 oz.

Quarter-Wave Whip for Your HT

by D.R. Kubichek N6JSX

This quarter-wave whip antenna is a viable alternative to a rubber ducky. It is slim, durable, lightweight, and inexpensive.

Construction Details

File or grind one end of a brass welding rod back about 1/4" to reduce its diameter so that the end can be securely put into the end hole of the BNC center pin connector.

Solder the end pin to the brass rod.

Slide about 1-1/2" of 3/32"-diameter heat-shrink tubing over the rod so that it covers the solder on the BNC center pin. Shrink the tubing using a match, lighter, or heat gun.

Slide about 1" of 1/8"-diameter heat-shrink tubing over the 3/16" tubing and shrink in place. Place the rod assembly into the BNC housing.

Slide a 2" piece of 3/32"-diameter heat-shrink tubing over the rod and crimp the end of the BNC connector. Shrink the tubing.

Measure from the crimped end of the BNC connector to the desired length for the band of operation. If you measure carefully, you should have an antenna resonant on the band of your choice.

SWR Adjustment

If you have an SWR bridge, you may want to fine-tune your antenna length for the best SWR reading (measure at the low end of the band). If the SWR is too high, just cut off in 1/16" pieces and take another measurement.

Since there are no ground-plane radials, you probably won't achieve a perfect match. Just cut off the excess rod until you get a *minimum* reading.

Round the tip of the rod with a file. You may want to add an inch or so of heat-shrink tubing to the end of the whip as well.

table 1. parts needed

BNC connector, crimp type, 3-piece

Brass welding rod 3/32"

Heat-shrink tubing 3/32", 1/8", 3/16"

Note: Any welding supply house and some hardware stores should have brass welding rods available.

table 2. rod dimensions

Frequency	Length
146 MHz	19.2"
222 MHz	12.6"
442 MHz	6.3"
1280 MHz	2.2"

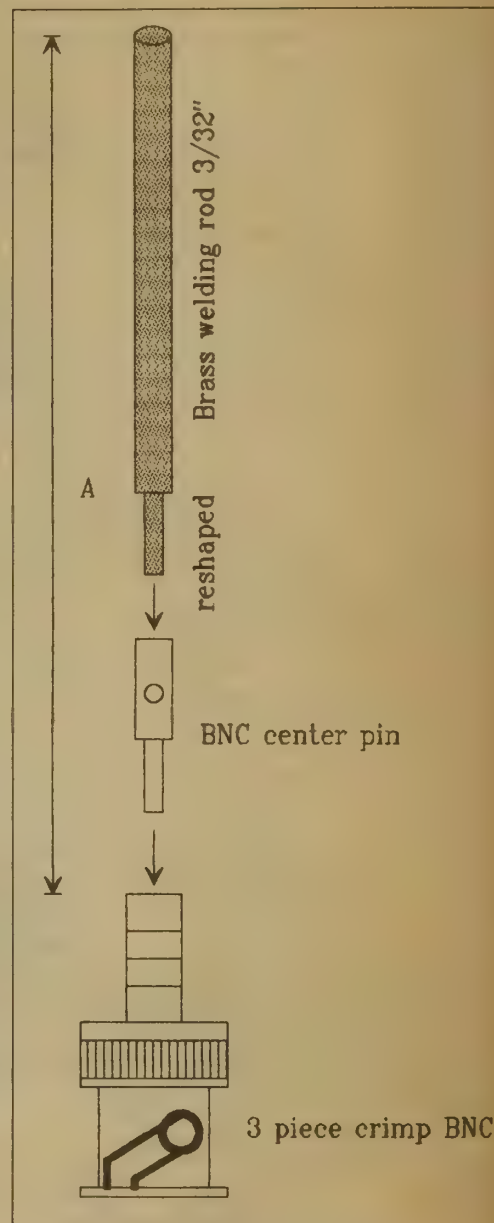


Figure. Assembly details for the quarter-wave HT whip.

Whip Your HT into Shape

You'll find that this whip antenna will perform better than a rubber duck. It should give you an extra boost when out in your repeater's fringe coverage area. In areas where I could just barely hear the repeater with my rubber duck, I now have good reception and can even access the machine. **RF**

Dale R. Kubichek N6JSX, Kuby Communications 19254 Tranbarger St., Rowland Heights CA 91748; 964-1188.

Operating OSCAR-13

From Jim KK3K, Philadelphia PA via Lambda Net News: I have so much fun with my satellite station that it is literally on (computer tracking program booted while I listen to the downlink passband) all the time when I'm home. The guys on the bird are like a club. There's a DX "clan," an unofficial net and an unofficial DX alert frequency of 145.890. You can check in and chat with the "regulars" or get QSL and "who's going to be on and when" info.

There's another group that hangs out on 145.94. The resident gurus of OSCAR-13 include John Fail KL7GRF, the DX king who can be found on 145.890, and Rex G4JUF from England who is usually on 145.94. They're *always* on the bird. They've invested much time, effort, and money into their stations because their signals are the best. They're always willing to help out with technical advice and recommendations, or just rag-chew about DX or satellites. They're all friendly and great cut-ups.

I mainly listen in or ask for info and then work my own stateside and DX on other frequencies. It is a totally different world from HF. You get to hear and talk to familiar voices from around the world. For example, I've made three contacts in the Philippines over the past year, all of them with the same operator. So you can get to know folks and have meaningful and multiple conversations.

National Tower Company ORDER TOLL FREE
P.O. Box 15417 Shawnee Mission, KS. 66285 800-762-5049
Hours 8:30-5:00 M-F Price Subject to Change Without Notice Local 913-888-8864

ROHN TOWERS

25G	10' section	\$59.50
45G	10' section	\$140.00
55G	10' section	\$180.00
BX-40	40' self supporting 6 sq ft	\$215.50
BX-48	48' self supporting 6 sq ft	\$274.50
BX-56	56' self supporting 6 sq ft	\$368.50
BX-64	64' self supporting 6 sq ft	\$474.50
HDX-40	40' self supporting 10 sq ft	\$249.50
HDX-48	48' self supporting 10 sq ft	\$339.50
HDX-56	56' self supporting 10 sq ft	\$432.00
HDX-64	64' self supporting 10 sq ft	\$533.00
HDX-48	48' self supporting 18 sq ft	\$423.50
HDX-56	56' self supporting 18 sq ft	\$523.50

Base stubs for BX series towers IN STOCK!

★ GUY WIRE SPECIAL ★

3/16EHS	500' galvanized 7 strand	\$45.00
1/4EHS	500' galvanized 7 strand	\$55.00

HYGAIN- TELEX & LARSEN ANTENNAS CALL FOR PRICES

CUSHCRAFT ANTENNAS

AOP-1	complete Oscar Link system	
AP8	8band 1/4wave vertical	
A3S	3 element triband beam	
A3WS	12-17 mtr HF yagi	
A103	Adds 30 mtr to A3WS	
A743	7 & 10 MHz add on kit for A3	
R5	10-12-15-17-20 mtrs	
R7	10-12-15-17-20-30-40 mtrs	
R57K	adds 30-40 mtrs to R5	
A4S	4 element triband beam	
ARX2B	2 mtr "Ringo Ranger"	
ARX450B	450 MHz "Ringo Ranger"	
AR270	144-148 435-450MHz duo Ringo	
A147-11	11 element 146-148 MHz beam	
A50-5S	50-54MHz 5 element Yagi	
215WB	15 element 2 mtr "Boomer"	
230WB	2-215WB Wideband "Boomers"	
10-4CD	4 element 10 mtr "Skywalker"	
15-4CD	4 element 15 mtr "Skywalker"	
13B2	2 meter, 13 elements	
17B2	2 meter, 17 elements	

Full Line of Cushcraft in STOCK - CALL

HUSTLER ANTENNAS

4BTV	40-10 mtr. vertical	\$84.00
5BTV	80-10 mtr. vertical	\$109.00
6BTV	6 band trap vertical	\$129.00

ROTORS

Alliance	U105	\$59.90
	HD73	\$139.90

TELEX - CD45II HAM IV & T2X - CALL

CAROL

CABLE

[2-18 & 6-22]	4080 - per foot	\$0.25
[2-16 & 6-20]	4090 - per foot	\$0.35
1108	RG8U Mini 8 low loss foam per foot	\$0.22
1198	RG8U Columbia superflex 100	\$31.00
1180	RG8U Low loss 100% bonded foil shield	
	88% tin copper braided shield-per foot	\$0.42
1176	RG213 Columbia - per foot	\$0.38

CELWAVE CELLFLEX

FLC1250J	1/2" copper (per foot)	\$2.15
FLC7850J	7/8" copper (per foot)	\$5.40
1/2" connector	\$28.80	7/8" connector \$69.00

TENNA PHASE III POWER SUPPLIES

PS4	Fully regulated, with surge protection, overload protection w/instant auto reset	\$21.90
PS7	Fully regulated, low ripple, protects against dangerous voltage surges	\$27.90
PS12	Fully regulated, electronic overload protection	\$39.90
PS20	Fully regulated, low ripple short circuit protection	\$74.90
PS25	Regulated, instant auto reset, dual meter for current & voltage	\$94.90

ASTRON Power Supplies

Model	AMPS	ICS	Price
RS7A	5	7	\$51.00
RS12A	9	12	\$73.00
RS20A	16	20	\$90.00
RS20M	16	20	\$110.00
RS35A	25	35	\$144.00
RS35M	25	35	\$165.00

OTHER ASTRONS AVAILABLE
CALL FOR PRICES

uniden



BC200XLT
\$239.90

200 Ch 12 Band w/800MHz, 10 priority ch's, ch lockout, scan delay, auto search, illuminated LCD display, snap-on battery pack, program-mable, track tuning, direct ch access, w/AC adapter, carry case, earphone.

BC800XLT \$234.90

40 CH 12 band w/800MHz & cellular telephone, track tuning, instant weather, scan delay, ch lockout, direct ch access, AC/DC.

BC560XLT \$94.90

16 Ch 10 band mobile, 2 digit LED display, scan delay, memory backup, channel lockout, direct ch access, weather search, squelch, channel review, track tuning, external speaker jack.

BC147XL \$89.90

16 Ch 10 band, weather, program-mable, delay, review, priority, memory backup, lockout, direct ch access, track tuning, AC/DC.

BC55XLT

10 Ch 10 band hand held \$114.90

BC70XLT

20 Ch 10 band w/batt pack \$149.90

BC100XLT

100 Ch 11 band hand held \$184.90

BC145XL

16 Ch 10 band, AC/DC \$88.90

BC177XL

16 Ch 11 band w/aircraft \$129.90

BC210XLT

40 Ch 11 band aircraft & weather \$169.90

BC855XLT

40 Ch 12 band w/800MHz base \$189.90

BC590XLT

100 Ch 11 band mobile weather \$199.90

BC760XLT

100 Ch 12 band w/800MHz mobile \$254.90

SUPER AMP

Compact per-amp designed to work w/hand held scanners & amplify the reception of VHF/UHF bands from 100MHz to 1GHz as high as 20dB, adjustable gain control, bypass switch.

9001

Super converter is designed to receive frequencies between 810MHz and 912MHz and convert them down to 410MHz through 512MHz, requires 9 volt battery or AC adapter.

8002

Hand held converter, same features as 9001, has bypass switch that allows user to go back to 400MHz without disconnecting the unit, BNC connectors

ASTATIC

Silver Eagle \$69.90

Chrome plated base station amateur microphone, factory wired to be easily converted to electronic or relay operation, adjustable gain for optimum modulation.

MAXON \$27.90

Model 49SX - 49 MHz, FM 2-WAY RADIO hands free operation, voice activated transmit up to 1/2 mile. Batteries optional

model 49F5

5 Ch FM 2-way, with Earphone mic, offers hands free voice activated or push-to-talk TX, VOX activated by Hi-Med-Low mic sensitivity switch, 5 1/2x2 1/2x1

10 METER TRANSCEIVERS

25 WATT all mode operation, backlit multi function LCD meter, frequency lock auto squelch NB RF gain PA external speaker jack 7 1/2x9 1/4x2 1/2 H

HR2510 CALL

RCI 2950

RANGER AR3500/100

CALL

CIRCLE 91 ON READER SERVICE CARD

Repeater Etiquette

by Alan Glasser NY2G

Often a new ham (or even an old ham) may develop bad habits and bad operating procedures only because of a lack of knowledge of proper procedures. This guide to repeater etiquette gives the conscientious repeater user some basic guidelines.

Before You Key the Mike

When first turning on your radio, listen to the frequency for at least 15-30 seconds before you transmit.

Speak into your microphone at a normal voice level. Don't mumble, ramble, slur, chew food or burp while talking.

Key your microphone before you speak and unkey it after you finish speaking.

If A Conversation Is In Progress

Don't break into the middle of the conversation if you have to make a call to another station or want to join the conversation. Wait (at least) until the thought in progress is completed and then announce your call sign. Do so by allowing the talking station to unkey the mike, and then make a quick call before the repeater "beeps" its courtesy tone or drops its squelch tail.

Identifying a station with "Break," "Call please," "Quickie," "Comment," or any other such words without station identification is not an acceptable form of identification, and those stations should not be acknowledged. However, "I have a comment, KX2ABC" is acceptable.

You don't have to identify after each

transmission—just once every 10 minutes, or at the end of the communication before you go off the air. If you think a new station coming on frequency doesn't know who you are, as a courtesy you can give your name and call. You do not have to identify any other station, only your own, but if you do, your identification (callsign) comes at the end of your transmission, e.g., "KZ3DEF and the group (or you can mention all callsigns in the group), this is KX2ABC."

The station that is to get the frequency next is the only station that should acknowledge the breaking station (a station breaking into an existing conversation). The reason for this is that the next station to get the frequency was supposed to talk next anyway, so why not let that station handle the breaking station?

Even if the breaking station is your best friend, if it's not your turn, don't say, "Hello, Seymour. How are you?" Wait until it's your turn.

Stations hearing another station calling have two choices: Acknowledge that you heard the calling station ("KX2ABC recognized.") and give the frequency to the station at the end of your conversation, or, if you have nothing important to say, give the frequency immediately to the calling station.

A station that is given the frequency after identifying can join the conversation in progress, and then give it back to the

station that gave it to him; or he can give it to the next station in a group discussion if he knows who gets it next. It is poor operating practice to throw the frequency up in the air for grabs.

If a breaking station is given the frequency to make a call, and if the call is not acknowledged, the breaking station should give it back to the station that gave it to him.

If a breaking station is given the frequency to make a call and the called station is contacted, the conversation should be brief, or both stations should move to an unused frequency, unless the station(s) originally talking on the frequency say it's okay to stay.

If you are in the middle of a long recitation and have to unkey the microphone in order not to time out the repeater, leave some room in case a breaking station has to make a transmission. Remember, a repeater is a very valuable asset to mobile stations who might have emergency traffic.

Leave some room after the courtesy beep or squelch tail has dropped to allow another station to break in if necessary.

Do not make comments or remarks during someone else's discussion.

Do not try to transmit over another station (called doubling). First of all, it's illegal; and second, nobody wins, since in most cases neither station can be understood.

If you think you are possibly doubling

with another station, unkey your mike for a few seconds and listen.

If the repeater is being controlled by one station, such as the weekly check-in net or a technical net, stations given a chance to talk should always give the frequency back to the net control station unless the net control station instructs them otherwise.

Emergency Traffic

If you are reporting an accident or other emergency traffic, the police department wants at least the following information: nature of the emergency, e.g., "Vehicle on fire"; location, including cross streets or mile markers (especially on a highway), e.g., "Belt Parkway eastbound, 100 yards past West Street exit"; description of vehicle(s), e.g., "White station wagon in the left lane"; any injuries, e.g., "Possible injuries."

When you are reporting (originating) emergency traffic (such as a mobile accident) to another station, make sure you stay on frequency in case the station handling (passing) the traffic has to furnish the responding agency (police, fire, etc.) with additional information.

If you are a mobile station passing emergency traffic directly through the repeater autopatch, let the emergency operator know that you are a MOBILE AMATEUR RADIO OPERATOR. If you are a base station passing emergency traffic, let the emergency operator know up front that you are an AMATEUR RADIO OPERATOR in communication with a mobile station. Emergency 911 operators should have been visited by members of the ham radio community and should know who we are. Could be a nice club project!

The Proper Lingo

"Q" signals were not designed for phone conversations, strictly for code. However, "Q" signals are finding their way into everyday phone conversations. You should know some of them; they were on the test. QSL?

Don't use 11 meter ("10-4 good buddy..."), military, police ("K"), or other terms not indigenous to the HAM bands.

To CQ or not to CQ, that is the question. While the most popular way of indicating that you are available for a conversation (QSO) is to announce that you're "listening" and waiting for another station to call you. I prefer to call CQ and make my intentions known—that I want to have a conversation. While this raises some eyebrows, I always find a station to talk to (even if they comment about me calling CQ).

The word(s) BREAK (not to be confused with a breaking station), BREAK BREAK, or BREAK BREAK BREAK, are reserved for emergency traffic. Any station in communication on frequency hearing the word BREAK should give the frequency to the breaking station. BREAK should not be used for breaking into a conversation just so you can get a turn to talk. (This might be an exception in certain parts of the country. Check with your local repeater users for advice.) "Break" is a term mostly found on 11 meters.

Remember: Amateur radio is a hobby! You can have fun on the repeater! You even can joke around! But keep it sensible!

RF

Contact Alan Glasser NY2G at 2133 66th Street, Brooklyn NY 11204.

ANTENNA SPEC • AMERITRON • ALPHA-DELTA • AEA • ASTRON

• B & W • BENCHER • BUTTERNUT • CUSHCRAFT • DIAMOND • HUSTLER • HYGAIN • ICOM • KANTRONICS •

KENWOOD • LARSEN • MFJ • MIRAGE/KLM • RF CONCEPTS • TEN-TEC • YAESU

Michigan Radio

SALES

23040 Schoenherr, Warren, MI 48089
OPEN MON-FRI 10-6, SAT 10-4, SUN CLOSED

KENWOOD

HT'S MODEL	DESCRIPTION	LIST	OURS
TH-225A	2M 5W SCANNING DEL	399.95	CALL
TH-27A	2M 2.5W MICRO 40ME	419.95	CALL
TH-47A	70CM 2.5W MICRO	429.95	CALL
TH-415	70CM 2W SCANNING DEL	419.95	CALL
TH-77A	2M/70CM DEL DUAL B	599.95	CALL

MOBILE VHF/UHF MODEL	DESCRIPTION	LIST	OURS
TM-241A	2M 45W PROG MIC	469.95	CALL
TM-331A	220MHZ 25W PROG MIC	469.95	CALL
TM-441A	440MHZ 25W PROG MIC	479.95	CALL
TM-631A	2M/220MHZ DUAL BAND	749.95	LMTD CALL
TM-791A	2M/70CM/2 TRI-BANDER	849.95	CALL
TM-741A	2M/70CM/2 TRI-BANDER	849.95	CALL
TM-941	2M/440M/1.2 TRI-BAN	1199.95	CALL
TM-751A	2M 25W ALL-MODE	699.95	CALL
TS-711A	2M 25W ALLMODE BASE	1059.95	CALL
TS-790A	2M/70CM SATELLITE	1999.95	CALL

HF EQUIPMENT MODEL	DESCRIPTION	LIST	OURS
TS-140S	HF COMP GEN COV	949.95	CALL
TS-690S	HF/6M COMP GEN COV	1549.95	CALL
TS-450S	HF DELUXE COMP	1349.95	CALL
TS-450S/AT	HFDEL COMP TUNR	1549.95	CALL
TS-850S	HF 12V DEL DDS	1699.95	CALL
TS-850/AT	HF 12V DEL TUNR	1899.95	CALL
TS-950S	HF BASIC VERSION	3299.95	CALL
TS-950SD	HF THE DX MACHINE!	4399.95	CALL

WE STOCK A FULL LINE OF ACCESSORIES FOR THE KENWOOD LINES. CALL FOR OUR DISCOUNTED PRICES! 1-800-TRU-HAMM

TERMS:
Prices Do Not Include Shipping.
Price and Availability Subject to
Change Without Notice
Most Orders Shipped The Same Day
COD's Welcome (\$4.00 + shipping)

ICOM

HT'S MODEL	DESCRIPTION	LIST	OURS!
IC-02AT	2M 5W 10MEM DTMF	409.00	CALL
IC-2GAT	2M 7W 15MEM DTMF	429.00	CALL
IC-2SAT	2M 2.5W DEL MICRO	439.00	CALL
IC-2SRA	2M/SCANNER HT	599.00	CALL
IC-24AT	2M/70CM DEL MICRO	499.95	CALL
IC-3SAT	220M 2.5W MICRO	449.00	CALL
IC-4SAT	70CM 2.5W MICRO	449.00	CALL
IC-4SRA	70CM/SCANNER HT	599.00	CALL
IC-4GAT	70CM 7W 15MEM DTMF	449.00	CALL
IC-W2A	2M/70CM DUAL MICRO	629.00	CALL

MOBILE VHF/UHF MODEL	DESCRIPTION	LIST	OURS!
IC-229A	2M FM, 25W 20MEM	449.00	CALL
IC-229H	2M FM, 45W 20MEM	479.00	CALL
IC-3220A	2M/70CM 25W 40MEM	659.00	CALL
IC-3220H	2M/70CM 45W 40MEM	699.00	CALL
IC-2410	2M/70CM 45W DEL.	TBA	CALL

HF EQUIPMENT MODEL	DESCRIPTION	LIST	OURS!
IC-725	HF COMPACT GEN COV	949.00	CALL
IC-726	HF/6M COMP GEN COV	1299.00	CALL
IC-735	HF DELUXE COMPACT	1149.00	CALL
IC-751A	HF 12V BASE TXCR	1699.00	CALL
IC-765	HF DELUXE TNR,PS	3149.00	CALL
IC-781	HF DX'ERS DELIGHT	6149.00	CALL

WE STOCK A FULL LINE OF ACCESSORIES FOR THE ICOM LINES. CALL FOR OUR DISCOUNTED PRICES! 1-800-TRU-HAMM

ORDERS
IN-STATE
SERVICE
FAX SERVICE

1-800-TRU-HAMM
1-313-771-4711
1-313-771-4712
1-313-771-6546

WANTED: QUALITY USED GEAR, CASH OR TRADE



YAESU

HT'S MODEL	DESCRIPTION	LIST	OURS
FT-411E	2M 2.5W 50MEM, CTCSS	405.00	CALL
FT-811	70CM 2.5W 50MEM	405.00	CALL
FT-470	2M/70CM 2.5W 50MEM	491.00	CALL
FT-26	2M-5W WITH/DTMS PAGING	349.00	CALL
FT-76	440MHz-5W WITH/DTMS PAGING	359.00	CALL

MOBILE VHF/UHF MODEL	DESCRIPTION	LIST	OURS
FT-290RII	2M 25W ALL-MODE	610.00	CALL
FT-690RII	6M 10W ALL-MODE	752.00	CALL
FT-736R	2M/70CM 220/1.2 SAT	1922.00	CALL
FT-5200	2M/70CM DUAL BAND	749.00	CALL
FT-6200	70CM/1.2 DUAL BAND	899.00	CALL
FT-2400H	2M 50W, LCD, CTCSS	419.00	CALL

HF EQUIPMENT MODEL	DESCRIPTION	LIST	OURS
FT-747GX	HF LGTWTG MOBILE	889.00	CALL
FT-757GXII	HF COMP GEN COV	1089.00	CALL
FT-767GX	HF 2/220/70C TUNR	2299.00	CALL
FT-990	HF 12V DEL TUNR +	2399.00	CALL
FT-1000B	HF BASIC VERSION	3399.00	CALL
FT-1000D	HF QSL CATCHER!!	4399.00	CALL

WE STOCK A FULL LINE OF ACCESSORIES FOR THE YAESU LINES. CALL FOR OUR DISCOUNTED PRICES! 1-800-TRU-HAMM

TEN-TEC

HF EQUIPMENT—AMERICAN MADE MODEL	DESCRIPTION	LIST	OURS
OMNI IV	HF 9 BAND TXCVR	2245.00	CALL
PARAGON	HF GEN COV TXCVR	2245.00	CALL

BATTERIES

Nickel-Cadmium, Alkaline, Lithium,
Sealed Lead Acid For Radios, Computers,
Etc. And All Portable Equipment

**YOU NEED BATTERIES?
WE'VE GOT BATTERIES!**

CALL US FOR FREE CATALOG



E.H.YOST & CO.

7344 TETIVA RD.
SAUK CITY, WI 53583

(608) 643-3194
FAX 608-643-4439

CIRCLE 114 ON READER SERVICE CARD

New Convert

by Mary Vaughn N5VGB

The words "amateur radio" became part of my vocabulary when I met my husband, Bruce W5HTX, forty-five years ago. When Bruce and I married and moved into our first apartment, I inherited Bruce's grandmother's antique feather bed and his amateur radio station. On one side of the bedroom was the feather bed, large and comfortable, and on the other side, occupying an entire wall, floor to ceiling, was the amateur radio station. It was a home-brew station, the results of three years of planning while Bruce was in the Air Force. He was very proud of his creation.

Early in our marriage I became accustomed to being awakened at 3 a.m. by the sound of a keying relay solidly attached to a metal chassis, and by the eerie glow of flashing blue light from mercury vapor rectifiers. About this time I first heard the term "long skip."

Many long skips later, we purchased a house. The rig was moved into a shack off the back porch, where it remained until our boys graduated from college and moved away from home. Their large upstairs bedroom above ours became the new ham shack.

I am still awakened at 3 a.m. when the DX is rolling in. The distinct sound of Morse code, coming from the room above, is a friendly sound; a sound that tells me all is right in my world.

After 43 years as the XYL of W5HTX, now NR5Q, I thought I knew all there was to know about ham radio. Now that I am about to become known by my own call letters rather than as Bruce's XYL, I find that I lived in a world of blissful ignorance.

Something Old, But New

Oh, I knew many of the terms used in amateur radio. I was familiar with the words QSO, short skip, sunspots, antenna garden, rare DX, Field Day, hamfests, elmers, and the local DX net. However, I knew very little about the pleasure and satisfaction derived from ham radio. After all, I was the typical ham widow.

Then my husband was appointed education chairman of our local ARC. The club teaches classes twice yearly for anyone interested in amateur radio. Classes are conducted at the local Vocational Technical School. Bruce told me about the next class that was forming, and he just happened to mention that it would prepare students for the new no-code Technician license as well as for the Novice license. He planned to teach theory and operating procedure; a good friend, N5NXH, would teach code.

Somewhere during the discussion I made a commitment to take the course. How this came about is still unclear. At the first meeting I learned that there were a number of XYLs in the class. During our break, after being overwhelmed with what we had undertaken, each of us confessed that she did not know what had prompted her to attend the class.

To my amazement, I really enjoyed the class. It became a challenge. Even though it had been years since I had taken a test, with the help of my elmer I slowly began to gain confidence in myself. I actually began to understand the meaning of terms that I had always thought of as "ham jar-

gon." Then something wonderful happened! I became interested and enthusiastic. I had discovered the world of ham radio.

We XYLs in the class gave support and encouragement to each other. When one of us became discouraged, the others urged her to continue. We have chosen different directions to reach our common goal. Our progress has been good. Even those of us working for our no-code Tech license are now studying code. We have one newly licensed ham, N5WEX; one XYL awaiting her Novice call and studying for her Tech exam; one no-code Tech waiting for her call; and two XYLs awaiting the next VE examination.

My elmer encouraged me to take my Technician examination during our local hamfest. Though he knew I was not ready, he felt it might help me to overcome my fear of the exam. The club had expected about 25 candidates to test for their licenses, and they had one team of VEs present. The test was to start at 1 p.m. When I arrived shortly before one, the break room of our local Vo-Tech School was full. The club quickly called in a second VE team to help. They tested 69 candidates that day.

I was finally admitted into the testing room at 4:30 p.m. I passed my Novice exam but failed my Tech by one question. It was a traumatic experience. I was tired, washed out, and had a splitting headache. I came very close to quitting. My elmer pulled me through, though. He said I was made of stronger stuff.

After a good night's sleep, I assessed my situation. I wanted my ham license! All I had to do was apply myself and use every study aid available to me. I had good teachers. I had my book *Now You're Talking*, the ARRL Technician License Manual, and both the Novice and Tech programs in my computer. I had my elmer. I couldn't fail. I was confident that I would be ready to take my exam at Ham-Com '91 in Texas that June.

Never Give Up!

When we arrived at the Arlington Convention Center, I went directly to the room where Novice and Technician examinations were being conducted. There were already a number of candidates waiting to take their exams. The room soon filled, and the overflow was moved into another area.

Although everyone knew that the new no-code Technician licenses would generate interest, no one was prepared for the numbers. Along with the newcomers interested in digital communications were the XYLs and YLs who had been waiting for this opportunity to enter amateur radio.

One examiner told me I had passed, only missing one question. From out of the past came an emotion I had not experienced since I was a high school senior in Tulsa, Oklahoma, in 1945. At that time all of our young men were being called into service, and women were replacing them in the job market. I applied, and was accepted, as an usher at the Ritz, the most prestigious theater in Tulsa. I left the theater walking on air. I was putting myself through high school and needed the money. This job would enable me to accomplish my goal. It was a terrific

boost to my self-esteem, and I was very proud.

Perhaps I had started studying for my license because I knew my husband would be pleased, but my pride of accomplishment was for myself. Somewhere along the way, it had become a personal desire. I wanted to become a ham!

When I told Bruce that I had passed and would receive my call in a few weeks, the look on his face was the same as the look he gave me when I gave birth to our children. He was as proud as I was. Not only was he my husband; he was also my teacher and my elmer.

Dallas Ham-Com '91

Early Saturday morning, Ham-Com '91 was in full swing. We arrived at 8 a.m. The flea market was packed. Charles N5NXH and his XYL, Pat, were with us. Pat and I browsed through the flea market until the trade center opened.

Both Bruce and Charles enjoy building ham equipment. They were looking for parts. Pat and I had promised to pick up literature and freebies from dealers before we took the bus tour with other XYLs at 10 a.m.

When the trade center opened, hams packed the hall, wall to wall. Among the most active dealers were those who had a plentiful stock and attractive display of smaller HTs. I stood back, admiring them myself. When we could afford to, Bruce had promised to buy one for me to carry in my purse.

When Pat and I returned from our trip, we found the car loaded down with old radio parts. After Charles and Bruce rearranged the trunk of the car, we were able to get into the back seat. As we were driving back to our motel, Bruce reached into a sack and handed me an Alinco DJ-F1T transceiver.

XYLs Appreciate Gear, Too!

Years ago, Bruce gave me my first 400 watt power pack for a camera for Christmas. I opened the present and cried. The family did not understand. Was I happy or disappointed? They could not know how important that 8" x 12" x 6" blue box was to me. It was an expression of his faith in my ability as well as of his love.

Women like hardware, too! Women pursuing an avocation realize that a blue power pack or small black transceiver can shine as brightly as a diamond ring.

We are both anxious for me to make my first contact. When watching my OM engaged in a 35 wpm CW QSO, even though I only catch his call and a letter now and then, I understand the pleasure he gets from CW. I do not expect to become a high speed operator myself, but I intend to conquer the code nevertheless. I have a wonderful friend, W0AWP, who lives in Wichita, Kansas. He has been a ham since 1923. Al and I are both looking forward to our first contact with each other.

Bruce is a dyed-in-the-wool CW operator who loves to rag-chew with DX stations. I'm interested in packet and he is anxious to help me put a station on the air. I purchased the ARRL's *General Class License Manual* at Ham-Com '91, and have set a goal to upgrade my license this year. I am looking forward to making new friends and enjoying the pleasures of ham radio for the rest of my life. **RF**

Mary Vaughn, 504 Maple Drive, Sprinkle AR 72764.

SATELLITE CITY
Communications for the Future

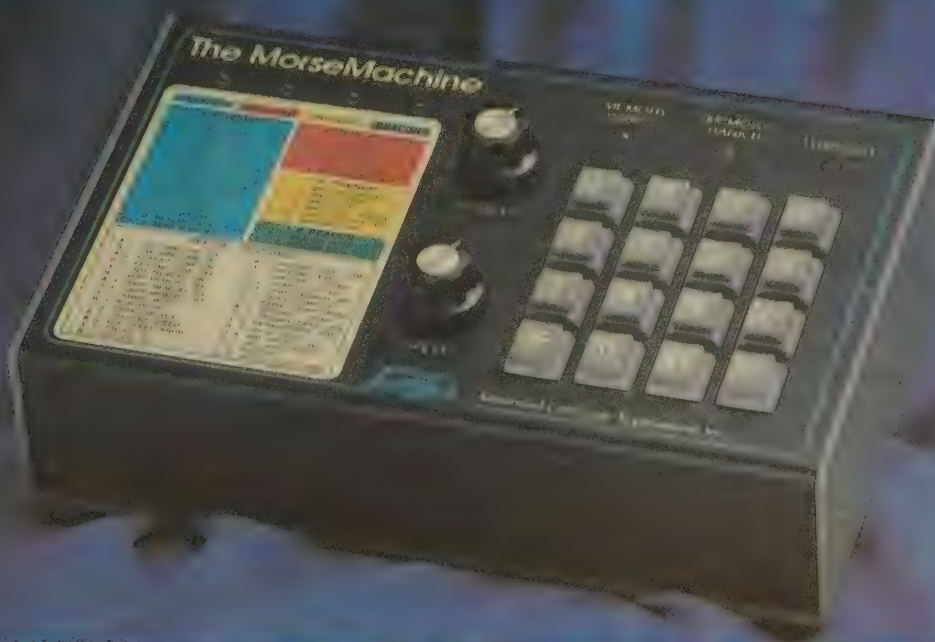
DAN KB0XC—KIRBY KA0ZTS—LOUIS KA0IPN
RON N0KMR—DENISE YL—MALINE XYL—MIKE S00N

1-800-426-2891

YAESU

FT-1000D	Call \$
FT-1000	Call \$
FT-76	Call \$
FT-75	Call \$
FT-74	Call \$
FT-73	Call \$
FT-72	Call \$
FT-71	Call \$
FT-70	Call \$
FT-69	Call \$
FT-68	Call \$
FT-67	Call \$
FT-66	Call \$
FT-65	Call \$
FT-64	Call \$
FT-63	Call \$
FT-62	Call \$
FT-61	Call \$
FT-60	Call \$
FT-59	Call \$
FT-58	Call \$
FT-57	Call \$
FT-56	Call \$
FT-55	Call \$
FT-54	Call \$
FT-53	Call \$
FT-52	Call \$
FT-51	Call \$
FT-50	Call \$
FT-49	Call \$
FT-48	Call \$
FT-47	Call \$
FT-46	Call \$
FT-45	Call \$
FT-44	Call \$
FT-43	Call \$
FT-42	Call \$
FT-41	Call \$
FT-40	Call \$
FT-39	Call \$
FT-38	Call \$
FT-37	Call \$
FT-36	Call \$
FT-35	Call \$
FT-34	Call \$
FT-33	Call \$
FT-32	Call \$
FT-31	Call \$
FT-30	Call \$
FT-29	Call \$
FT-28	Call \$
FT-27	Call \$
FT-26	Call \$
FT-25	Call \$
FT-24	Call \$
FT-23	Call \$
FT-22	Call \$
FT-21	Call \$
FT-20	Call \$
FT-19	Call \$
FT-18	Call \$
FT-17	Call \$
FT-16	Call \$
FT-15	Call \$
FT-14	Call \$
FT-13	Call \$
FT-12	Call \$
FT-11	Call \$
FT-10	Call \$
FT-9	Call \$
FT-8	Call \$
FT-7	Call \$
FT-6	Call \$
FT-5	Call \$
FT-4	Call \$
FT-3	Call \$
FT-2	Call \$
FT-1	Call \$
FT-0	Call \$
FT-00	Call \$
FT-01	Call \$
FT-02	Call \$
FT-03	Call \$
FT-04	Call \$
FT-05	Call \$
FT-06	Call \$
FT-07	Call \$
FT-08	Call \$
FT-09	Call \$
FT-10	Call \$
FT-11	Call \$
FT-12	Call \$
FT-13	Call \$
FT-14	Call \$
FT-15	Call \$
FT-16	Call \$
FT-17	Call \$
FT-18	Call \$
FT-19	Call \$
FT-20	Call \$
FT-21	Call \$
FT-22	Call \$
FT-23	Call \$
FT-24	Call \$
FT-25	Call \$
FT-26	Call \$
FT-27	Call \$
FT-28	Call \$
FT-29	Call \$
FT-30	Call \$
FT-31	Call \$
FT-32	Call \$
FT-33	Call \$
FT-34	Call \$
FT-35	Call \$
FT-36	Call \$
FT-37	Call \$
FT-38	Call \$
FT-39	Call \$
FT-40	Call \$
FT-41	Call \$
FT-42	Call \$
FT-43	Call \$
FT-44	Call \$
FT-45	Call \$
FT-46	Call \$
FT-47	Call \$
FT-48	Call \$
FT-49	Call \$
FT-50	Call \$
FT-51	Call \$
FT-52	Call \$
FT-53	Call \$
FT-54	Call \$
FT-55	Call \$
FT-56	Call \$
FT-57	Call \$
FT-58	Call \$
FT-59	Call \$
FT-60	Call \$
FT-61	Call \$
FT-62	Call \$
FT-63	Call \$
FT-64	Call \$
FT-65	Call \$
FT-66	Call \$
FT-67	Call \$
FT-68	Call \$
FT-69	Call \$
FT-70	Call \$
FT-71	Call \$
FT-72	Call \$
FT-73	Call \$
FT-74	Call \$
FT-75	Call \$
FT-76	Call \$
FT-77	Call \$
FT-78	Call \$
FT-79	Call \$
FT-80	Call \$
FT-81	Call \$
FT-82	Call \$
FT-83	Call \$
FT-84	Call \$
FT-85	Call \$
FT-86	Call \$
FT-87	Call \$
FT-88	Call \$
FT-89	Call \$
FT-90	Call \$
FT-91	Call \$
FT-92	Call \$
FT-93	Call \$
FT-94	Call \$
FT-95	Call \$
FT-96	Call \$
FT-97	Call \$
FT-98	Call \$
FT-99	Call \$
FT-100	Call \$
FT-101	Call \$
FT-102	Call \$
FT-103	Call \$
FT-104	Call \$
FT-105	Call \$
FT-106	Call \$
FT-107	Call \$
FT-108	Call \$
FT-109	Call \$
FT-110	Call \$
FT-111	Call \$
FT-112	Call \$
FT-113	Call \$
FT-114	Call \$
FT-115	Call \$
FT-116	Call \$
FT-117	Call \$
FT-118	Call \$
FT-119	Call \$
FT-120	Call \$
FT-121	Call \$
FT-122	Call \$
FT-123	Call \$
FT-124	Call \$
FT-125	Call \$
FT-126	Call \$
FT-127	Call \$
FT-128	Call \$
FT-129	Call \$
FT-130	Call \$
FT-131	Call \$
FT-132	Call \$
FT-133	Call \$
FT-134	Call \$
FT-135	Call \$
FT-136	Call \$
FT-137	Call \$
FT-138	Call \$
FT-139	Call \$
FT-140	Call \$
FT-141	Call \$
FT-142	Call \$
FT-143	Call \$
FT-144	Call \$
FT-145	Call \$
FT-146	Call \$
FT-147	Call \$
FT-148	Call \$
FT-149	Call \$
FT-150	Call \$
FT-151	Call \$
FT-152	Call \$
FT-153	Call \$
FT-154	Call \$
FT-155	Call \$
FT-156	Call \$
FT-157	Call \$
FT-158	Call \$
FT-159	Call \$
FT-160	Call \$
FT-161	Call \$
FT-162	Call \$
FT-163	Call \$
FT-164	Call \$
FT-165	Call \$
FT-166	Call \$
FT-167	Call \$
FT-168	Call \$
FT-169	Call \$
FT-170	Call \$
FT-171	Call \$
FT-172	Call \$
FT-173	Call \$
FT-174	Call \$
FT-175	Call \$
FT-176	Call \$
FT-177	Call \$
FT-178	Call \$
FT-179	Call \$
FT-180	Call \$
FT-181	Call \$
FT-182	Call \$
FT-183	Call \$
FT-184	Call \$
FT-185	Call \$
FT-186	Call \$
FT-187	Call \$
FT-188	Call \$
FT-189	Call \$
FT-190	Call \$
FT-191	Call \$
FT-192	Call \$
FT-193	Call \$
FT-194	Call \$
FT-195	Call \$
FT-196	Call \$
FT-197	Call \$
FT-198	Call \$
FT-199	Call \$
FT-200	Call \$
FT-201	Call \$
FT-202	Call \$
FT-203	Call \$
FT-204	Call \$
FT-205	Call \$
FT-206	Call \$
FT-207	Call \$
FT-208	Call \$
FT-209	Call \$
FT-210	Call \$
FT-211	Call \$
FT-212	Call \$
FT-213	Call \$
FT-214	Call \$
FT-215	Call \$
FT-216	Call \$
FT-217	Call \$
FT-218	Call \$
FT-219	Call \$
FT-220	Call \$
FT-221	Call \$
FT-222	Call \$
FT-223	Call \$
FT-224	Call \$
FT-225	Call \$
FT-226	Call \$
FT-227	Call \$
FT-228	Call \$
FT-229	Call \$
FT-230	Call \$
FT-231	Call \$
FT-232	Call \$
FT-233	Call \$
FT-234	Call \$
FT-235	Call \$
FT-236	Call \$
FT-237	Call \$
FT-238	Call \$
FT-239	Call \$
FT-240	Call \$
FT-241	Call \$
FT-242	Call \$
FT-243	Call \$
FT-244	Call \$
FT-245	Call \$
FT-246	Call \$
FT-247	Call \$
FT-248	Call \$
FT-249	Call \$
FT-250	Call \$
FT-251	Call \$
FT-252	Call \$
FT-253	Call \$
FT-254	Call \$
FT-255	Call \$
FT-256	Call \$
FT-257	Call \$
FT-258	Call \$
FT-259	Call \$
FT-260	Call \$
FT-261	Call \$
FT-262	Call \$
FT-263	Call \$
FT-264	Call \$
FT-265	Call \$
FT-266	Call \$
FT-267	Call \$
FT-268	Call \$
FT-269	Call \$
FT-270	Call \$
FT-271	Call \$
FT-272	Call \$
FT-273	Call \$
FT-274	Call \$
FT-275	Call \$
FT-276	Call \$
FT-277	Call \$
FT-278	Call \$
FT-279	Call \$
FT-280	Call \$
FT-281	Call \$
FT-282	Call \$
FT-283	Call \$
FT-284	Call \$
FT-285	Call \$
FT-286	Call \$
FT-287	Call \$
FT-288	Call \$
FT-289	Call \$
FT-290	Call \$
FT-291	Call \$
FT-292	Call \$
FT-293	Call \$
FT-294	Call \$
FT-295	Call \$
FT-296	Call \$
FT-297	Call \$
FT-298	Call \$
FT-299	Call \$
FT-300	Call \$
FT-301	Call \$
FT-302	Call \$
FT-303	Call \$
FT-304	Call \$
FT-305	Call \$
FT-306	Call \$
FT-307	Call \$
FT-308	Call \$
FT-309	Call \$
FT-310	Call \$
FT-311	Call \$
FT-312	Call \$
FT-313	Call \$
FT-314	Call \$
FT-315	Call \$
FT-316	Call \$
FT-317	Call \$
FT-318	Call \$
FT-319	Call \$
FT-320	Call \$
FT-321	Call \$
FT-322	Call \$
FT-323	Call \$
FT-324	Call \$
FT-325	Call \$
FT-326	Call \$
FT-327	Call \$
FT-328	Call \$
FT-329	Call \$
FT-330	Call \$
FT-331	Call \$
FT-332	Call \$
FT-333	Call \$
FT-334	Call \$
FT-335	Call \$
FT-336	Call \$
FT-337	Call \$
FT-338	Call \$
FT-339	Call \$
FT-340	Call \$
FT-341	Call \$
FT-342	Call \$
FT-343	Call \$
FT-344	Call \$
FT-345	Call \$
FT-346	Call \$
FT-347	Call \$
FT-348	Call \$
FT-349	Call \$
FT-350	Call \$
FT-351	Call \$
FT-352	Call \$
FT-353	Call \$
FT-354	Call \$
FT-355	Call \$
FT-356	Call \$
FT-357	Call \$
FT-358	Call \$
FT-359	Call \$
FT-360	Call \$
FT-361	Call \$
FT-362	Call \$
FT-363	Call \$
FT-364	Call \$
FT-365	Call \$
FT-366	Call \$
FT-367	Call \$
FT-368	Call \$
FT-369	Call \$
FT-370	Call \$
FT-371	Call \$
FT-372	Call \$
FT-373	Call \$
FT-374	Call \$
FT-375	Call \$
FT-376	Call \$
FT-377	Call \$
FT-378	Call \$
FT-379	Call \$
FT-380	Call \$
FT-381	Call \$
FT-382	Call \$
FT-383	Call \$
FT-384	Call \$
FT-385	Call \$
FT-386	Call \$
FT-387	Call \$
FT-388	Call \$
FT-389	Call \$
FT-390	Call \$
FT-391	Call \$
FT-392	Call \$
FT-393	Call \$
FT-394	Call \$
FT-395	Call \$
FT-396	Call \$
FT-397	Call \$
FT-398	Call \$
FT-399	Call \$
FT-400	Call \$
FT-401	Call \$
FT-402	Call \$
FT-403	Call \$
FT-404	Call \$
FT-405	Call \$
FT-406	Call \$
FT-407	Call \$
FT-408	Call \$
FT-409	Call \$
FT-410	Call \$
FT-411	Call \$
FT-412	Call \$
FT-413	Call \$
FT-414	Call \$
FT-415	Call \$
FT-416	Call \$
FT-417	Call \$
FT-418	Call \$
FT-419	Call \$
FT-420	Call \$
FT-421	Call \$
FT-422	Call \$
FT-423	Call \$
FT-424	Call \$
FT-425	Call \$
FT-426	Call \$
FT-427	Call \$
FT-428	Call \$
FT-429	Call \$
FT-430	Call \$
FT-431	Call \$
FT-432	Call \$
FT-433	Call \$
FT-434	Call \$
FT-435	Call \$
FT-436	Call \$
FT-437	Call \$
FT-438	Call \$
FT-439	Call \$
FT-440	Call \$
FT-441	Call \$
FT-442	Call \$
FT-443	Call \$
FT-444	Call \$
FT-445	Call \$
FT-446	Call \$
FT-447	Call \$
FT-448	Call \$
FT-449	Call \$
FT-450	Call \$
FT-451	Call \$
FT-452	Call \$
FT-453	Call \$
FT-454	Call \$
FT-455	Call \$
FT-456	Call \$
FT-457	Call \$
FT-458	Call \$
FT-459	Call \$
FT-460	Call \$
FT-461	Call \$
FT-462	Call \$
FT-463	Call \$
FT-464	Call \$
FT-465	Call \$
FT-466	Call \$
FT-467	Call \$
FT-468	Call \$
FT-469	Call \$
FT-470	Call \$
FT-471	Call \$
FT-472	Call \$
FT-473	Call \$
FT-474	Call \$
FT-475	Call \$
FT-476	Call \$
FT-477	Call \$
FT-478	Call \$
FT-479	Call \$
FT-480	Call \$
FT-481	Call \$
FT-482	Call \$
FT-483	Call \$
FT-484	Call \$
FT-485	Call \$
FT-486	Call \$
FT-487	Call \$
FT-488	Call \$
FT-489	Call \$
FT-490	Call \$
FT-491	Call \$
FT-492	Call \$
FT-493	Call \$
FT-494	Call \$
FT-495	Call \$
FT-496	Call \$
FT-497	Call \$
FT-498	Call \$
FT-499	Call \$
FT-500	Call \$
FT-501	Call \$
FT-502	Call \$
FT-503	Call \$
FT-504	Call \$
FT-505	Call \$
FT-506	Call \$
FT-507	Call \$
FT-508	Call \$
FT-509	Call \$
FT-510	Call \$
FT-511	Call \$
FT-512	Call \$
FT-513	Call \$
FT-514	Call \$
FT-515	Call \$
FT-516	Call \$
FT-517	Call \$
FT-518	Call \$
FT-51	

The MM-3 Morse Machine is...



Without a doubt, the MM-3 Morse Machine from AEA is the ultimate keyer. Whether you're a contester, DX chaser or ragchewer, there is *no better memory keyer available.*

Just look at these memory keyer features:

- 20 "soft-partitioned" memories (8K standard, expandable to 32K).
- Complete adjustability of your Morse signal – dot & dash length, letter & word spacing, and more.
- Straight, Bug, Iambic, and Curtis A&B™ keying modes so you can use the MM-3 just like you've used other keyers in the past.
- Enter commands via the keypad or from a computer through the MM-3's serial port (optional).
- Automatic serial number generation and insertion.
- Paddle reverse command to accommodate different types of paddles.
- Common command list on the front panel for quick and easy operation.
- Real-time or automatic memory spacing.

The Ultimate Keyer!

In addition to these features, the MM-3 is also a full-fledged Morse trainer with four training modes:

- DX Contest Simulator — practice realistic CW contesting without going on the air!
- QSO Simulator — practice realistic rag-chews without going on the air. Great tune-up for license class upgrades.
- Random four-letter word generation with increasing speed.
- Random letter generation.

With a computer, you can check your copy or download a specialized training session into the MM-3's memory!

These are only some of the best features of the MM-3.

To find out more, see your AEA Authorized Dealer or call the AEA InfoLine at 1-800-432-7388.



**Advanced Electronic
Applications, Inc.**

P.O. Box C2160/2006 196th St. S.W. • Lynnwood, WA 98036-0918
Tech Support (206) 775-7373 • Office (206) 774-5554 • CompuServe ID 76702,1013

All stated specifications are subject to change without notice or obligation
© Copyright 1991 by Advanced Electronic Applications, Inc. All Rights Reserved.



try something new

by Bill Brown WB8ELK

Public Service

How would you like to take an active part in the operation of a major public event? Wouldn't it be great to watch an airshow from the control tower, walk in the Rose Parade, sail in a yacht race or even fly in the Goodyear blimp? All these things are possible if you're willing to help out with amateur radio.

Marathons and running events, bicycle races, road rallies, parades and airshows are just a few of the events that your radio club or group could provide with communications. In any event that attracts a crowd, the major concern is that of public safety. In case of an emergency, it pays to have a communications network ready to respond to any eventuality. A quick response will certainly make a difference in a life-threatening situation.

Emergency Preparedness

Participation in this kind of an event will help you learn how to operate during an emergency communications net. You'll know just what to do to help out in a disaster. After all, emergency communications is one of the reasons that amateur radio exists in the first place! Not only that, you'll have the thrill of going behind the scenes at the event and may even end up as part of it.

Let's take a look at one such event that occurs annually in central New Hampshire.

The Warbirds Airshow

Every year during the third weekend of September over 30,000 people attend the Warbirds Airshow at the Manchester, New Hampshire, airport. This two-day event is sponsored by the New England Escradille (a group that specializes in restoring vintage military aircraft). Spectators get a chance to view the aircraft up close in the morning and watch them perform in the afternoon.

Any large event such as this requires quite an organizational scheme to keep

things running smoothly (the amateur radio communications effort is no exception). John Keller NF1N has been doing an admirable job of organizing the ham radio communications during the last few years. Starting in May, he signs up recruits at hamfests, area radio clubs and via some of the local repeaters. This year over 58 amateur radio operators participated. Most of the 37 checkpoints were operational during a good part of the airshow. As an example of just a few of these positions, amateur radio operators were positioned with: the airshow announcer, the chairman and co-chairman, flight line safety, the FAA inspector, crowd control, the medical tent, handicap parking, and the airboss in the airport control tower. A number of these positions were actually operated mobile via golf carts as the airshow coordinators moved about.

John NF1N, Chris KA1SIE, Joel KC1SG and Dick N1FIL operated the net control station out of one of the hangars using the KC1HH 147.375 2 meter repeater that was located on the roof of one of the hangars. In addition, they cross-linked the 2 meter machine

to 224.58 MHz via a remote in one of the vans in the parking lot so that the Novices could participate.

A Rough Landing!

Throughout the two days, the group was kept busy responding to handicap assistance at the parking lot, making sure that spectators didn't smoke near the fueling area and taking care of any medical problems that cropped up.

Of course, in an airshow the real danger is that of low-flying aircraft doing potentially hazardous acrobatics. During the late afternoon hours on Sunday, the weather started to deteriorate. As one of the AT-6 trainer aircraft landed, a gust of wind caused him to veer off of the runway. One of his landing gears collapsed and the plane spun around and nearly flipped over as it came to rest in the grass on the far side of the runway (see the sequence in Photo E). One wing was damaged, and the possibility of fuel leakage spelled a potentially disastrous situation (fortunately, the pilot was not hurt)!

This is just the kind of situation where it's invaluable to have an emergency network in place. Although everything was resolved safely, if there had been any danger to the spectators, amateur radio operators could have responded immediately.

How to Participate

If you'd like to get involved with an event, start out at your local radio club and see what kind of activities they cover. If there is a public event that you think would be helped out by amateur radio, bring it up at your club or just talk about it on the local repeaters. You may even be able to organize your own

effort. Not only will your group have a great time, they will also have a great way to demonstrate amateur radio to the community. It may just be all that's needed to recruit a few new hams.

If you would like to participate in next year's Warbirds Airshow in New Hampshire, drop a line to John Keller NF1N at 7 Bryant Rd., Nashua NH 03062. RF



Photo A. Mission control at the Warbirds Airshow. (l to r): John NF1N, Chris KA1SIE, Lisa N1KDQ and Andy KA1ZFQ.



Photo B. Critch N1ASZ and John NF1N man a checkpoint near one of the WWII bombers.



Photo D. Golf-cart mobile at the spectator viewing area.



Photo C. Communicating with mission control from the flight line area.



Photo E. An AT-6 trainer makes a rough landing after veering off of the runway. Photo sequence by Charles R. Cole.

ARE

YOU

A

Radio Fun

Subscriber?

☐ **YES**

☐ **NO**

Radio Fun

Subscribe Now! 12 issues for \$9.97

____ YES! Send me one year (12 issues) of *Radio Fun* for the low price of \$9.97.

For instant service call toll free 1-800-257-2346 (or call 603-525-4201).

Name _____ (Please print) _____ Call _____

Address _____

City _____ State _____ Zip _____

Charge my: ☐ MC ☐ Visa ☐ Payment enclosed

Card number _____ Exp. date _____

Class License _____ Year Licensed _____ 73 Subscriber _____ QST Subscriber _____ CQ Subscriber _____

Canada add \$7 plus 70¢ GST. Foreign add \$12 surface, \$36 airmail. Newsstand rate \$24. Basic subscription rate \$14.97.

O2R

Radio Fun

READER SERVICE CARD

January 1992

THIS CARD VALID UNTIL 2/29/92

Name _____ Call _____

Address _____

City _____ State _____ Zip _____

Where did you get this copy of *Radio Fun*?

A ☐ Newsstand B ☐ Subscription

1	2	3	4	5	6	7	8	9	10	201	202	203	204	205	206	207	208	209	210
11	12	13	14	15	16	17	18	19	20	211	212	213	214	215	216	217	218	219	220
21	22	23	24	25	26	27	28	29	30	221	222	223	224	225	226	227	228	229	230
31	32	33	34	35	36	37	38	39	40	231	232	233	234	235	236	237	238	239	240
41	42	43	44	45	46	47	48	49	50	241	242	243	244	245	246	247	248	249	250
51	52	53	54	55	56	57	58	59	60	251	252	253	254	255	256	257	258	259	260
61	62	63	64	65	66	67	68	69	70	261	262	263	264	265	266	267	268	269	270
71	72	73	74	75	76	77	78	79	80	271	272	273	274	275	276	277	278	279	280
81	82	83	84	85	86	87	88	89	90	281	282	283	284	285	286	287	288	289	290
91	92	93	94	95	96	97	98	99	100	291	292	293	294	295	296	297	298	299	300
101	102	103	104	105	106	107	108	109	110	301	302	303	304	305	306	307	308	309	310
111	112	113	114	115	116	117	118	119	120	311	312	313	314	315	316	317	318	319	320
121	122	123	124	125	126	127	128	129	130	321	322	323	324	325	326	327	328	329	330
131	132	133	134	135	136	137	138	139	140	331	332	333	334	335	336	337	338	339	340
141	142	143	144	145	146	147	148	149	150	341	342	343	344	345	346	347	348	349	350
151	152	153	154	155	156	157	158	159	160	351	352	353	354	355	356	357	358	359	360
161	162	163	164	165	166	167	168	169	170	361	362	363	364	365	366	367	368	369	370
171	172	173	174	175	176	177	178	179	180	371	372	373	374	375	376	377	378	379	380
181	182	183	184	185	186	187	188	189	190	381	382	383	384	385	386	387	388	389	390
191	192	193	194	195	196	197	198	199	200	391	392	393	394	395	396	397	398	399	400

FREE PRODUCT INFORMATION

Reader Service: To receive more information on the products advertised in this issue of *Radio Fun* circle the appropriate number. Please allow 6 weeks for processing of inquiry. Offer valid in the U.S. and possessions only.



try something new

by Bill Brown WB8ELK

Public Service

How would you like to take an active part in the operation of a major public event? Wouldn't it be great to watch an airshow from the control tower, walk in the Rose Parade, sail in a yacht race or even fly in the Goodyear blimp? All these things are possible if you're willing to help out with amateur radio.

Marathons and running events, bicycle races, road rallies, parades and airshows are just a few of the events that your radio club or group could provide with communications. In any event that attracts a crowd, the major concern is that of public safety. In case of an emergency, it pays to have a communications network ready to respond to any eventuality. A quick response will certainly make a difference in a life-threatening situation.

Emergency Preparedness

Participation in this kind of an event will help you learn how to operate during an emergency communications net. You'll know just what to do to help out in a disaster. After all, emergency communications is one of the reasons that amateur radio exists in the first place! Not only that, you'll have the thrill of going behind the scenes at the event and may even end up as part of it.

Let's take a look at one such event that occurs annually in central New Hampshire.

The Warbirds Airshow

Every year during the third weekend of September over 30,000 people attend the Warbirds Airshow at the Manchester, New Hampshire, airport. This two-day event is sponsored by the New England Escradille (a group that specializes in restoring vintage military aircraft). Spectators get a chance to view the aircraft up close in the morning and watch them perform in the afternoon.

Any large event such as this requires quite an organizational scheme to keep

to 224.58 MHz via a remote in one of the vans in the parking lot so that the Novices could participate.

A Rough Landing!

Throughout the two days, the group was kept busy responding to handicap assistance at the parking lot, making sure that spectators didn't smoke near the fueling area and taking care of any medical problems that cropped up.

Of course, in an airshow the real danger is that of low-flying aircraft doing potentially hazardous acrobatics. During the late afternoon hours on Sunday, the weather started to deteriorate. As one of the AT-6 trainer aircraft landed, a gust of wind caused him to veer off of the runway. One of his landing gears collapsed and the plane spun around and nearly flipped over as it came to rest in the grass on the far side of the runway (see the sequence in Photo E). One wing was damaged, and the possibility of fuel leakage spelled a potentially disastrous situation (fortunately, the pilot was not hurt!).

This is just the kind of situation where it's invaluable to have an emergency network in place. Although everything was resolved safely, if there had been any danger to the spectators, amateur radio operators could have responded immediately.

How to Participate

If you'd like to get involved with an event, start out at your local radio club and see what kind of activities they cover. If there is a public event that you think would be helped out by amateur radio, bring it up at your club or just talk about it on the local repeaters. You may even be able to organize your own

effort. Not only will your group have a great time, they will also have a great way to demonstrate amateur radio to the community. It may just be all that's needed to recruit a few new hams.

If you would like to participate in next year's Warbirds Airshow in New Hampshire, drop a line to John Keller NF1N at 7 Bryant Rd., Nashua NH 03062. RF



Photo A. Mission control at the Warbirds Airshow. (l to r): John NF1N, Chris KA1SIE, Lisa N1KDQ and Andy KA1ZFQ.

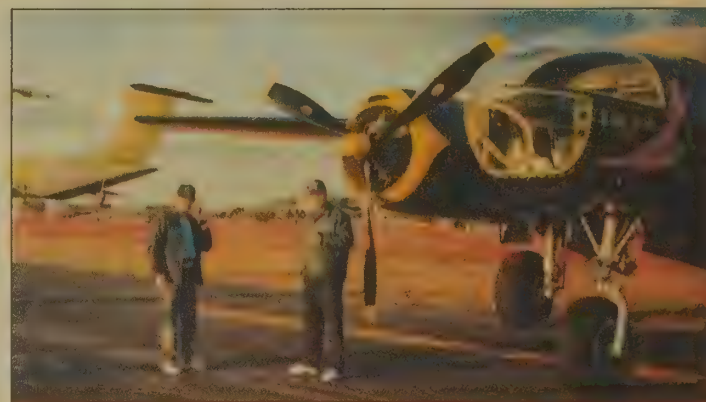


Photo B. Critch N1ASZ and John NF1N man a checkpoint near one of the WWII bombers.



Photo C. Communicating with mission control from the flight line area.



Photo D. Golf-cart mobile at the spectator viewing area.



Photo E. An AT-6 trainer makes a rough landing after veering off of the runway. Photo sequence by Charles R. Cole.

ARE

YOU

A

Radio Fun

Subscriber?

☐ **YES**

☐ **NO**

☐ YES

You obviously are a highly gifted and intelligent person. You want the latest in news and features, written especially for the newcomer to amateur radio. You also know a good deal when you see it. Why not order another subscription for one of your friends?

☐ NO

What are you, nuts? Don't you know that *Radio Fun* is the only magazine written especially for newcomers to amateur radio? Do you think we can hold the price down to a measly \$9.97 forever? Subscribe today, or you may never forgive yourself.

Subscribe
to

Radio Fun

12 issues for
only \$9.97



Use this handy
order card or
Call
1-800-257-2346

Get

free information
from our
advertisers.



Send in your
free
Reader Service
Card today!

Radio Fun

Subscribe Now! 12 issues for \$9.97

____ YES! Send me one year (12 issues) of *Radio Fun* for the low price of \$9.97.

For instant service call toll free 1-800-257-2346 (or call 603-525-4201).

Name _____ (Please print) Call _____

Address _____

City _____ State _____ Zip _____

Charge my: ☐ MC ☐ Visa ☐ Payment enclosed

Card number _____ Exp. date _____

Class License _____ Year Licensed _____ 73 Subscriber _____ QST Subscriber _____ CQ Subscriber _____

Canada add \$7 plus 70¢ GST. Foreign add \$12 surface, \$36 airmail. Newsstand rate \$24. Basic subscription rate \$14.97.

O2R

Radio Fun

READER SERVICE CARD

January 1992

THIS CARD VALID UNTIL 2/29/92

Name _____ Call _____

Address _____

City _____ State _____ Zip _____

Where did you get this copy of *Radio Fun*?

A ☐ Newsstand B ☐ Subscription

1	2	3	4	5	6	7	8	9	10	201	202	203	204	205	206	207	208	209	210
11	12	13	14	15	16	17	18	19	20	211	212	213	214	215	216	217	218	219	220
21	22	23	24	25	26	27	28	29	30	221	222	223	224	225	226	227	228	229	230
31	32	33	34	35	36	37	38	39	40	231	232	233	234	235	236	237	238	239	240
41	42	43	44	45	46	47	48	49	50	241	242	243	244	245	246	247	248	249	250
51	52	53	54	55	56	57	58	59	60	251	252	253	254	255	256	257	258	259	260
61	62	63	64	65	66	67	68	69	70	261	262	263	264	265	266	267	268	269	270
71	72	73	74	75	76	77	78	79	80	271	272	273	274	275	276	277	278	279	280
81	82	83	84	85	86	87	88	89	90	281	282	283	284	285	286	287	288	289	290
91	92	93	94	95	96	97	98	99	100	291	292	293	294	295	296	297	298	299	300
101	102	103	104	105	106	107	108	109	110	301	302	303	304	305	306	307	308	309	310
111	112	113	114	115	116	117	118	119	120	311	312	313	314	315	316	317	318	319	320
121	122	123	124	125	126	127	128	129	130	321	322	323	324	325	326	327	328	329	330
131	132	133	134	135	136	137	138	139	140	331	332	333	334	335	336	337	338	339	340
141	142	143	144	145	146	147	148	149	150	341	342	343	344	345	346	347	348	349	350
151	152	153	154	155	156	157	158	159	160	351	352	353	354	355	356	357	358	359	360
161	162	163	164	165	166	167	168	169	170	361	362	363	364	365	366	367	368	369	370
171	172	173	174	175	176	177	178	179	180	371	372	373	374	375	376	377	378	379	380
181	182	183	184	185	186	187	188	189	190	381	382	383	384	385	386	387	388	389	390
191	192	193	194	195	196	197	198	199	200	391	392	393	394	395	396	397	398	399	400

FREE PRODUCT INFORMATION

Reader Service: To receive more information on the products advertised in this issue of *Radio Fun* circle the appropriate number. Please allow 6 weeks for processing of inquiry. Offer valid in the U.S. and possessions only.

4AWH1



BUSINESS REPLY MAIL

FIRST CLASS

PERMIT NO 211

MANCHESTER NH

POSTAGE WILL BE PAID BY ADDRESSEE

Radio Fun

PO Box 4926

Manchester NH 03108-9839

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



**Subscribe Now!
12 issues for
only \$9.97**

**Just mail
this card
or**

Call

1-800-257-2346



Place
Stamp
Here

Radio Fun

READER SERVICE MANAGEMENT DEPARTMENT

PO BOX 8708

BOULDER CO 80329-8708

FREE
product
information
←



advertiser index

RS# Advertiser	Page	RS# Advertiser	Page	RS# Advertiser	Page	RS# Advertiser	Page
* Advanced Electronic Application	15	146 Creative Control Products	10	293 Innotek, Inc.	22	* New Dimension QSL's	24
67 Alinco Electronics	CV2	252 D&D Cliffdweller	28	240 Jan Crystals	17	* Oklahoma Comm Center	23
45 Amateur TV Quarterly	28	29 D&L Fabrication	10	2 Kawa Productions	19	* P.C. Electronics	28
89 Antennas West	10	130 Dandys	29	234 Lentini Communications	24	152 PacComm	17
138 Antennas West	12	53 Delaware Amateur Supply	19	46 Marcomp	27	68 Periphex	8
5 Antennas West	14	114 E. H. Yost	14	101 Maxcom, Inc.	10	* Personal Database	18
135 Antennas West	21	* Electronic Distributors	26	* Meadowlake Corporation	25	132 Quement Electronics	22
107 Antennas West	22	193 GGTE	24	* Metro Printing	21	110 Radio Amateur Satellite	4
90 Antennas West	26	72 Glen Martin Engineering	24	86 MFJ Enterprises	5	279 RAI Enterprises	24
16 Astron Corporation	11	64 H & M Jewelry	25	162 Michigan Radio	13	224 RAI Enterprises	20
41 Barry Electronics Corporation	3	* Hamwear	28	114 Mr. Nicad	14	34 Ramsey Electronics	9
105 Battery Tech, Inc.	7	179 Icom	CV4	91 National Tower Co.	12	153 Satellite City	14
						95 Sensible Solutions	25
						250 Software Systems	17
						244 Software Systems	21
						103 Spangler Express	24
						124 Texas Bug Catcher Antenna	17
						119 Tiare Publications	22
						62 TNR	20
						11 Transel Tech.	20
						136 Unadilla Antenna Mfg. Co.	27
						* Universal Radio	25
						104 VIS Study Guides, Inc.	20
						* Vanguard Labs	19
						14 VHF Communications	25
						* Yaesu Electronics Corporation	CV3

JAN Crystals

your reliable source for a world of crystal clear communication



- Commercial Two-Way
- MicroProcessors
- Amateur/Experimental
- Scanners/Monitors/Pagers
- Satellite-Telemetry
- Plus custom applications

EXPEDITED ORDER SERVICE!

FOR FREE CATALOG, CALL OR WRITE:



JAN CRYSTALS

P.O. Box 06017 Ft. Myers, FL 33906



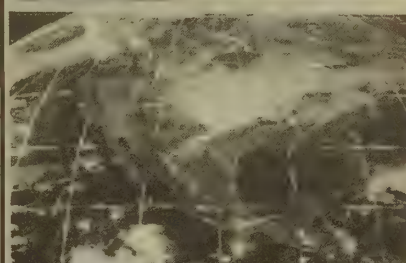
TOLL FREE 1-800-526-9825

(813) 936-2397 FAX ORDERS: 1-813-936-3750

CIRCLE 240 ON READER SERVICE CARD

A Wide Selection of
ARRL BOOKS
are available from
Uncle Wayne's Bookshelf.
See page 29 of this issue

WEFAX To The Max



PC GOES/WEFAX 3.0 \$250

PC GOES/WEFAX 3.0 is a professional fax reception system for the IBM PC. It includes an AM/FM demodulator, software, cassette tutorial and 325 page manual. Check this partial list of our advanced features:

- Res. up to 1280x800x256
- Unattended Operation
- Colorization
- Zoom, Pan, Rotation
- Contrast Control
- Tuning Oscilloscope
- Photometry/Histograms
- APT Lat/Lon. Grids
- Orbital Prediction
- Frame Looping
- PCX & GIF Export
- Grayscale Printing
- Infrared Analysis
- Variable IOC & LPM

PC HF FACSIMILE 5.0 \$99

PC HF Facsimile 5.0 is a complete shortwave FSK fax system for the IBM PC. It includes an FSK Demodulator, software, 250 page manual and tutorial cassette. Call or write for a complete catalog of products.

Software Systems Consulting
615 S. El Camino Real, San Clemente, CA 92672
Tel: (714) 498-5784 Fax: (714) 498-0568

CIRCLE 250 ON READER SERVICE CARD

THE GREAT MOBILE PEAR



THE TEXAS BUGCATCHER HF Mobile Antenna System

- Hi Q air-wound coils
- Minimum SWR—excellent performance on all HF bands
- Easy assembly to meet almost any configuration
- Fits standard 3/8-24 SAE mounts
- Various length base masts & whips available

Henry Allen WB5TYD
214-388-4724 8 am-4 pm weekdays
903-527-4163 evenings & weekends

Send for free brochure!

GLA Systems
PO Box 425
Caddo Mills, TX 75135

COMET ANTENNAS FOR THE PROFESSIONAL AMATEUR

CPR-5800

Dual-Bander 146/446MHz
Gold plated center conductor
for excellent electrical efficiency!

Wave Length: 146MHz 7/8 Wave
446MHz 5/8 Wx3

Gain: 146MHz 5.0dB
446MHz 7.6dB

Impedance: 50 ohms

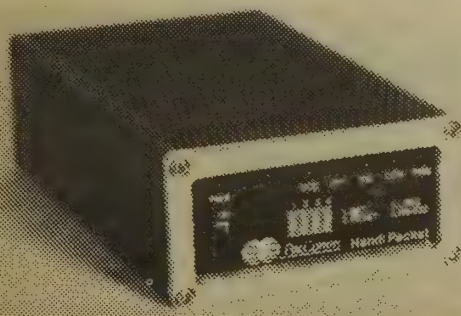
VSWR: 1.5:1 or less

Max. Power: 120 watts

Length: 5'

Connector: UHF

CIRCLE 124 ON READER SERVICE CARD



PacComm

- Advanced Technology
- Enduring Value

4413 N. Hesperides St., Tampa, FL 33614-7618
(813) 874-2980 Fax: (813) 872-8696 (800) 223-3511

Leading Provider of Packet Equipment for Amateur Radio

Broad selection including the following features:

- Portable
- VHF and HF Models
- Internal Cards for PCs
- Amateur Satellite Modems
- High Speed
- Low Cost

HandiPacket PORTABLE PACKET CONTROLLER

"One of PacComm's Handipackets is
Aboard the MIR Space Station
Listen for U2MIR on 145.55 MHz"

CIRCLE 152 ON READER SERVICE CARD

Building Global Friendships

Encouraging Soviet hams in digital modes.

by David Larsen KK4WW, John Douglas NØISL, and Bob Friebertshauser W6YMR



Photo A. FAIRS Executive Director David Larsen KK4WW, on the right, presents a TNC donated by PacComm to Vasilij Bondarenko UV3BW, Chief of the Krenkel Central Radio Club, for use at UK3F Moscow.

"Building Global Friendships" is the purpose of FAIRS (the Foundation for Amateur International Radio Service). FAIRS members hope that goodwill can be created between our nations and fellow radio amateurs by providing training, equipment, volunteers, exchange visits, as well as other forms of assistance.

We feel that radio amateurs can really make a difference in the world we live in by using the common bond hams have for each other to develop friendships and break through international barriers.

During October of 1990 two of us, David KK4WW and Gaynell Larsen, made our first visit to the U.S.S.R. That first trip had seemed the high point of my teaching and hamming

ing this past visit.

We were able to share this second trip with John Douglas NØISL from Minnesota, and Bob W6YMR and his wife Virginia from Tennessee. John joined the trip to assist with a seminar and to meet in person Ukrainian and Russian hams who he knows from the airways. Bob and Virginia were on a combined rotary, missionary, and ham trip to help organize projects in these areas in the U.S.S.R.

Logistics

In addition to the mountain of personal luggage, which also contained gifts and teaching materials, there was almost half a ton of ham radio (TNCs, HTs, as well as HF and VHF transceivers) and computer equipment to



Photo B. John Douglas NØISL (seated), operating from U5WF in Lvov. Standing, left to right, are Victor Goncharsky UB5WE/KC1VF, Helen Goncharsky RB5WA, and Victor's dad, Vlad Goncharsky U5WF.

experiences. We had combined a seminar on computer automation at Lvov Polytechnic Institute with a chance to operate ham radio stations in both Lvov in the Ukraine and Moscow. By May 1991, we had organized a return visit to establish the very first HF digital emergency radio network in the Soviet Union. We were looking forward to visiting the friends we had made dur-

aid in setting up a digital network within the U.S.S.R. This project was being coordinated by Victor Goncharsky UB5WE/KC1VF in Lvov, who received the support of the Radio Sports Federation (RSF) after I wrote to Mikhail Gorbachev, President of the U.S.S.R., providing information on this project and requesting support. President Gorbachev responded by

sending a letter to Mr. Yuri Zubarev, President of the RSF. Mr. Zubarev indicated that the RSF would be glad to help make arrangements for the shipment and delivery of this equipment.

The paperwork required to bring this much equipment and material into the country seemed endless, as bureaucracy in Eastern Europe is a well-developed science. But after we received the formal acknowledgment from RSF President Mr. Yuri Zubarev, this barrier disappeared and all the transportation and customs clearances fell in place. The paperwork was not all Soviet, as the materials also had to be approved by the U.S. Department of Commerce, Office of Technology, and Policy Analysis. But, to their credit, the U.S. officials were helpful, and expedited all of our requests.

One week before our departure, all the computer equipment was sent to Aeroflot Airlines in New York, to be sent on to Moscow. The first authorization was for only 200 kilograms, but after many phone calls, Aeroflot received authorization to ship an additional 280 kilograms. There is a lot of bureaucracy to go through in getting these events to happen, and persistent effort is required by all involved. Victor and his group did get the equipment, but without the help of the RSF it would not have been possible.

Out of four groups wanting to sponsor us, we accepted invitations from Lvov Polytechnic Institute in Lvov, and Ulyanovsk Polytechnic Institute in Ulyanovsk. TECOP, a private enterprise, co-sponsored the Lvov part of our trip. We planned to teach a four-day microcomputer seminar as well as two half-day round-table discussions on the use of computers in science and economics. With the official invitations, we were able to obtain visas in about 10 days.

A call to Radio Sport made it possible for us to use our own call signs portable in the U.S.S.R. Victor arranged for us to have a host station in each city, and coordinated this request with RSF.

From Moscow to Lvov

We arrived in Moscow on May 10, and were met at the airport by a delegation from Lvov, Ukraine, including our Soviet host, Victor Goncharsky. Others were Eugene Kaminsky, a professor at Lvov Polytechnic Institute; Yuri Katyutin UA4LCQ, of the Ulyanovsk Polytechnic Institute; Val Kudryavtsev UA4LM; two other sponsors from Ulyanovsk, Russia; and our good friend Vladimir Stoltmov from Moscow. Such a welcoming committee is even more impressive when you know that Lvov is a 24-hour trip, and Ulyanovsk a 10-hour trip, by train from Moscow.

Victor, Eugene, and the five of us Americans departed that night by train for Lvov. As we passed through each city, Victor pointed out the antennas of hams. We also saw the antenna farm of Radio Moscow, an ugly array fed by enough power lines to light a small city. About 12 hams and some other people met us at the train station in

Lvov, and generously helped us with our bags.

Lvov is a beautiful city of about 900,000 people in the western Ukraine. The architecture reflects a Western influence, as Lvov has also been a part of Austria and Poland. The open green areas and many lakes almost seemed like home to John, who lives in Minnesota.

The next day, we had a wonderful visit at the home of Victor's father, Vlad Goncharsky U5WF. Victor's wife, Helen RB5WA, prepared a delicious Ukrainian meal. The hamming started soon afterwards, and continued every day as we had time. The three of us made about 4,000 contacts during our visit. John and Dave worked DXCC from Vlad's station during our 12 days there.

Making Friends and Agreements

Our official work started on Monday, May 12, at the Lvov Polytechnic Institute (LPI). Eugene Kaminsky was responsible for arranging sponsorship by LPI and TECOP, and Dr. Savenko Serge, another professor at LPI, was responsible for many of our activities and planning. In addition to the workshop and round table, we had many meetings with the president of LPI and other officials. I signed a protocol exchange agreement between LPI and the Virginia Polytechnic Institute (VPI), where I have been a faculty member for 24 years. The agreement was for teaching, student exchange, and research. We also had many meetings with various officials of private and government enterprises, as they were most interested in learning about how we do things here in the U.S. They want to join with Western activities as soon as they can.

After completing our official duties, we were able to spend all our time on ham activities. We spent most of our time with Victor and his dad Vlad, assembling the first 2 meter ham repeater in the Ukraine. The computers did not arrive in Moscow when we did, so we only had our personal equipment—four HTs, three VHF transceivers (in kit form, as assembled units could not be brought into the country), an ICOM IC-735 for UB5WE, and an IC-720 for UB5WCV.

We also had two hard drives for Victor's computer, which made it possible for him to get the APLINK station on the air, as well as nine TNCs and one AEA PK-232. We'd been informed that connectors were difficult to obtain, so we had several pounds of coax, RS-232, phone jacks, and plugs with us. Victor and Vlad had every piece of equipment operational before we departed Lvov for Ulyanovsk, Russia. Victor even installed one of the hard disk drives at about 3 a.m. He was up all night—like a kid in the candy store, as we would say.

John spent much of his time with ham activities, operating from stations U5WF, UY5XE, UB5WCV, and Lvov club station UB4WZA. He also participated in a fox hunt with Helen RB5WA. Also, during our stay, Helen gave up a weekend to represent the Soviet Union in the 80 meter QRP contest held in Bulgaria. We all appreciated that. She was an XYL winner for the Soviet Union in that contest last year.

Fox hunting, or hidden transmitter hunting, is a major sport throughout the Soviet Union. The Soviet military

LOGic™
professional-
quality
ham radio
software!
New version

LOGic Jr. and LOGic II software for ham radio. Features include: QSL cards, DXing, contesting, traffic handling, rag chewing, or awards chasing. LOGic family can handle it.

Welcome to amateur radio! We would like to introduce you to our ham radio software -- LOGic Jr. for quality at a low price, and LOGic II for the ultimate in features and flexibility.

Good software can add more to the enjoyment of ham radio than any other accessory. You will want to keep records of interesting conversations, contacts with exotic places, third-party messages, QSL cards, etc. Wherever your interests may lead--DXing, contesting, traffic handling, rag chewing, or awards chasing, the LOGic family can handle it.

Please ask for our free 10-page illustrated info pack. You will find LOGic has the most features -- like on-line tracking for nearly any award. User-defined fields. Customizable logging screen. Streamlined data entry. Fast, flexible, easy retrieval. Auto logging of country, zones, etc. Displays DX and direction. LOGic II features auto scoring for nearly any contest, interfacing to most computerized radios and antenna rotors, QSL manager database facility, and much more.

While LOGic's advanced features satisfy the most experienced operator, self-explanatory menus, online help, a superb manual, & phone support let the beginner master the basic functions quickly.

You will find LOGic is an inexpensive yet valuable addition to your station. LOGic Jr. is \$39, LOGic II is \$79, ppd in US & Canada. For IBM, Amiga, and Atari ST. Coming for Mac.

MasterCard VISA
Personal Database Applications

Dept RF
2616 Meadow Ridge Dr
Duluth, GA 30136-6037

☎ 404-242-0887
Fax 404-449-6887

8 AM - 6 PM M-Th
8 AM - Noon Fri

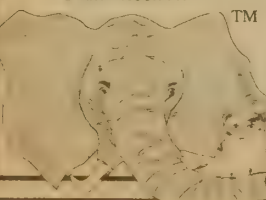
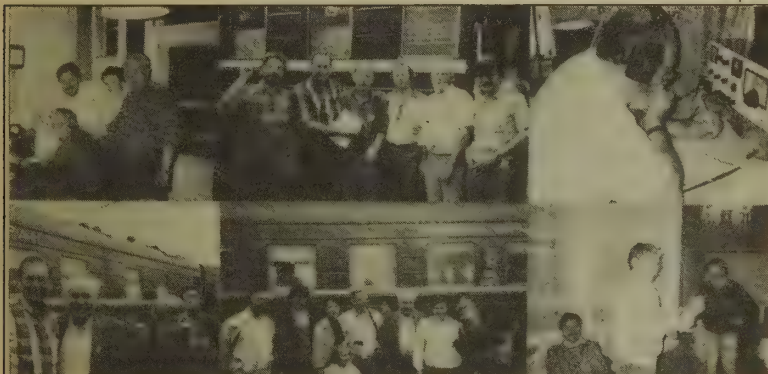




Photo C. At Ulyanovsk Polytechnic Institute: Dr. Vyacheslav A. Sergeev, Vice-Rector UPI, Gaynell Larsen (callsign on way), Virginia Friebertshauser, Dr. Sergei V. Skvortzov, Chief of Research UPI, and Bob Friebertshauser W6YMR. (That's N0ISL behind Dr. Sergeev.)

provides a great deal of support for this event. Contestants, each carrying a hand-held directional antenna, compete in three trials: on 80 meters, 10

out of five. These transmitters must be located in order, and often cover 20 kilometers. Some competitions are as long as 26 miles.



UB5W	Oblast 66	N0ISL	John R. Douglas	19164 - 147th St. N.W.
	LVQV, Ukraine			Elk River, MN 55330, USA
UA4L	Oblast 164	KK4WW	David G. Larsen	P.O. Box 341
	Ulyanovsk Russia	W6YMR	Bob Friebertshauser	Floyd, VA 24091, USA
				426 Ellsworth
				Memphis, TN 38111, USA

Photo E. The QSL card commemorating the FAIRS visit to the Soviet Union.

meters, and 2 meters. Typically, five transmitters are hidden in the area. Each of these transmit for one minute

Victor was a wonderful host, and kept all meetings on schedule. He also did all the translation for our group.

We are all studying as hard as we can to learn the Russian language, but we'll always need help in translation from Victor.

One afternoon, Victor arranged for most of the hams of Lvov to meet us in the park. About 20 hams showed up to exchange QSLs and photos, and to just visit. It was a heartwarming experience to have all these folks show up just to meet and visit the Americans.

Our last night in Lvov, we had official signing of our logbooks. Vlad, Helen, and Victor confirmed our 4,000 contacts. The next day, at least 30 people came to see us off to Ulyanovsk by Aeroflot Airlines, and give us more gifts. We all had tears of happiness to have met so many kind and sharing people.

Ulyanovsk

When we arrived in Ulyanovsk at about 10 p.m., a group of people met us, including Yuri Katyutin UA4LCQ, research director of microwave physics, and Vyacheslav Sergeev, vice-rector of Ulyanovsk Polytechnic Institute (UPI). Victor traveled with us on the entire trip, and made sure all arrangements were ready well in advance.

Ulyanovsk, the town where Lenin was born and raised, is a beautiful city on the Volga River. We were treated to a river cruise where the Volga is 10 miles wide. The next morning, the celebration of the 343rd year of Ulyanovsk was in full progress, so there was much color, dancing in the streets, partying, and special events with folks in the traditional colorful Russian dress. Social activities of the evening included making Bob, John, and Dave full members of the Ulyanovsk Signal DX club.

The next day we visited the elementary school Lenin attended as a child. Yuri told us he had attended this



Photo D. John Douglas N0ISL receives trophy for first American to work DXCC from the Ukraine. Left to right: Victor UB5WE/KC1VF, John N0ISL, George Chlijanc UY5XE, and Helen RB5WA

school, too. The young students were most interested in seeing Americans. The rest of the day, we visited the faculty at UPI and conducted the half-day round-table discussion. About 25 people attended, and everyone was awarded Virginia Tech certificates of attendance. We were informed that we were the first Americans to lecture at UPI. We presented a variety of computer textbooks to Vice-Rector Vyacheslav Sergeev for use by the faculty. They were very much appreciated.

We were given a tour of some of the research laboratories, then began work on an exchange agreement between UPI and Virginia Tech. Yuri informed us that they planned to install a ham station at UPI. Victor once again provided his superb translating talents for all our activities. Without his help, the trip just would not have been possible.

That evening, John took time for ham contacts at the station of Valentin Kudryavtev UA4LM.

As usual, we had a big group to bid us farewell upon departure. Yuri joined us for the overnight trip to Moscow.

Radio Sport Federation

Back in Moscow, Vladimir drove us to visit with the RSF. We had no idea what to expect. It turned out to be a very productive meeting with Vasilij Bondarenko UV3BW, chief of the Central Radio Club; Nikolai Kazasnskij UA3AF, vice-president of the RSF; Vera Sveridova, chief of Box 88 QSL bureau; and other staff members. We thanked the RSF for helping to arrange transportation of the equipment for Victor's group.

We encouraged the view that Soviet amateurs be allowed to use digital modes at lower levels of licensing. At present, only the very highest class license holder can use any digital modes. We explained that in the U.S., our no-code Technician has full digital privileges above 50 MHz. Mr. Bondarenko expressed much interest in this. We also encouraged maximum efforts to have the third party and reciprocal licensing agreement with the U.S. approved. These documents had already been fully approved by our State Department; they are just waiting for the approval of the Ministries of

MORSE CODE MUSIC?

Yes it's true! Now the morse code alphabet can be learned and enjoyed while doing aerobics, jogging, driving or dancing. Order "THE RHYTHM OF THE CODE" cassette single hit today!

Send \$5.95 check or money order (please add \$2.00 S&H) to:

Kawa Productions

P.O. Box 319
Weymouth, MA 02188
Mass Residents please add 5% sales tax
Dealer inquiries welcome

CIRCLE 2 ON READER SERVICE CARD

SPY ON THE EARTH

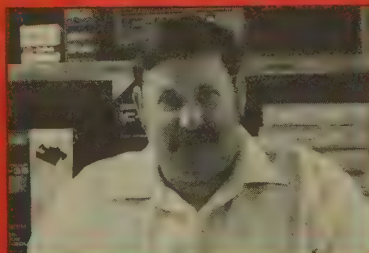
See on your computer screen what 6 or more U.S., Russian and Japanese satellites see. Make money many ways. Makes a terrific science project. We manufacture and sell all the equipment you need. In business since 1956.

For complete details dial our electronic bulletin board anytime. 300-2400 baud. Modem configuration: 8 bits, 1 stop, no parity: (718)-740-3911. Voice 8AM-1PM: (718)-468-2720.

Or send \$10 for fantastic 5 disk program set for your IBM-PC.

Vanguard Labs

196-23 Jamaica Ave., Hollis NY 11423



Rob, WA3QI

800-441-7008

New Equipment Order & Pricing

302-328-7728

SERVICE, USED GEAR INFO



Paul, WA1QK

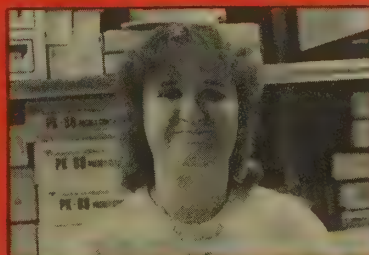
Delaware Amateur Supply

71 Meadow Road, New Castle, Del. 19720

9-5 Monday-Friday, 9-3 Saturday

Factory Authorized Dealer!

AEA • AMERITRON • CUSHCRAFT • DIAMOND • ICOM • KANTRONICS • KENWOOD
• MFJ • STANDARD • TELEX IV GAIN • TENTEK • YAESU • AND MORE



Don, K4RTH

Celebrating
Our
15th Year

No Sales Tax in Delaware! one mile off I-95



CIRCLE 53 ON READER SERVICE CARD

TRANSEL TECHNOLOGIES
A DIVISION OF LJ ELECTRONIC INDUSTRIES
123 East South Street • Harveysburg, Ohio 45032
1 (800) 829-8321

Model TSC1
Transel Slurp Cup Mounting Kit
\$12⁹⁵

Model TDC1
Transel Heavy-Duty Hat Clip
\$12⁹⁵

Model TWM
Transel Slim Line Window Mount Kit
\$24⁹⁵

Model T144-10
Transel Modified Gain Quarter Wave Antenna
\$14⁹⁵

Write for a Full Line Antenna Catalog at No Cost!
— DEALERS WELCOME —
Made In The USA...Because It Matters!

CIRCLE 11 ON READER SERVICE CARD

SUPPORT RESEARCH.

It Works Wonders.

American Heart Association

Communication and Foreign Affairs in Moscow.

A TNC donated by PacComm and an IBM clone computer were delivered to UK3F while we were there. Then a Moscow TV news team showed up, and filmed our visit for the 6 p.m. news. We were able to get our own video directly off Vladimir's TV with John's camcorder. Mr. Bondarenko gave us some very nice gifts to remember our visit to the Central Radio Club.

Later that day, we met with Editor-in-Chief Anatoly Gorokhovskiy of *Radio Magazine*. We discussed his publication, and submitted an article by Dick Anderson W4OLD about the original Radio Central on Long Island, New York. Then we met Vice-Editor Boris Stepanov UW3AX. He told us of their work with the Soviet cosmonauts, and in particular the leading role they play in training them for the ham activity on the *Mir*, the Soviet orbiting space station. On concluding our meeting, we delivered a TNC and IBM-clone computer to UK3R for their use in amateur emergency and space communications.

Full Speed Ahead

With all the changes that have taken place since August 19, it is not known what the future of amateur radio will be like in what was the U.S.S.R. Our feeling is that it will get better, particularly in dealing with emergency communication and the ability of FAIRS to bring equipment into the republics. The Radio Sport Federation will surely be much different. We will probably be dealing with each republic on a separate basis, which will require setting up new methods for shipping equipment and getting permission for these activities. It will be confusing for awhile, but in the long term, the hams will probably benefit in a positive way. We are in contact with our Soviet ham friends several times a week, and the attitude is "full speed ahead." FAIRS is proceeding with several projects with our U.S. and Soviet members.

As a result of this visit, and with an enormous amount of dedicated work by all Soviet FAIRS members, the Soviet Union now has a digital network. APLINK station U5WF (UBWF) operates on 14.075 MHz which ties into a network of seven VHF packet stations. In addition, two HF packet stations are now operational at the UK3F Krenkel Central Radio Club and at the UK3R club station at *Radio Magazine*.

We had many wonderful experiences at the homes of our hosts, their families, and new friends. Thanks to amateur radio, we can keep our friendship renewed often. **RF**

About FAIRS

The purpose of FAIRS, the Foundation for Amateur International Radio Service, is "Building Global Friendships" between peoples and nations. This goodwill is created by providing training, equipment, volunteers, exchange visits, and other forms of assistance FAIRS members are able to provide.

Radio amateurs can really make a difference in the world we live in by using the common bond hams have for each other to develop friendships and goodwill in many ways. FAIRS is not limited to helping only amateurs, but any individual, group, or government. FAIRS only becomes involved in activities that have the highest personal and legal ethics.

FAIRS's first project was to help with equipment and training for the first HF digital emergency radio network in the Soviet Union. About half a ton of computers, TNCs, HTs, HF and VHF transceivers were made available by donations from many organizations and corporations. It was difficult to get this equipment into the U.S.S.R., but with assistance from the Radio Sport Federation in Moscow, the equipment was shipped on Soviet Aeroflot Airlines from New York to Moscow.

FAIRS Soviet operations director Victor Goncharsky UB5WE/KC1VF coordinated the Soviet activities of members David Larsen KK4WW, Gaynell Larsen, John Douglas NØISL, and Bob Friebertshauser W6YMR and his wife Virginia. On July 30, 1991, Victor reported that the visit by the U.S.A. FAIRS delegation, plus an enormous amount of dedicated work by all Soviet FAIRS members, resulted in an amateur packet 144 MHz network in Lvov, Ukraine, which now consists of seven stations. It has become the second largest station of its kind in the U.S.S.R., and is continuing to grow.

The first U.S.S.R. APLINK station was installed at U5WF in Lvov on July 15, 1991, giving the VHF packet users the ability to exchange messages with the outside world on shortwave.

The packet mailbox stations at the Krenkel Central Radio Club station UK3F and *Radio Magazine* station UK3R in Moscow were installed, accompanied by three HF packet stations in Ulyanovsk, Russia.

This digital HF/VHF network could and is actually used to pass all kinds of emergency messages. In addition, the very first 2 meter repeater in the Ukraine is operational in Lvov.

FAIRS founding members are KK4WW, NØISL, W6YMR, Gaynell Larsen, UB5WE, U5WF, RB5WA, UA4LM, UA4LCQ, UB5BPR, UB5WCV, and UY5XE.

You can be a part of this personally rewarding work by joining the organization, perhaps even representing FAIRS in some activities; you can help obtain needed equipment for projects, or make a contribution so others can carry on the work of FAIRS. For more information, contact David Larsen KK4WW, Director of Operations FAIRS, P.O. Box 341, Floyd VA 14091. Tel. (703) 745-4023 or (703) 382-9099.

TNR-YOUR BATTERY STORE

ICOM BATTERY INSERTS

BP-2	7.2v	500mah	\$14.00
BP-3	8.4v	270mah	\$15.00
BP-5	10.8v	500mah	\$21.00
BP-7	13.2v	500mah	\$23.00
BP-8	8.4v	800mah	\$21.00
BP-22	8.4v	270mah	\$22.00

KENWOOD BATTERY INSERTS

PB-21	7.2v	200mah	\$12.00
PB-21H	7.2v	600mah	\$15.00
PB24 Tabs	9.6v	600mah	\$15.00
PB-25/26	8.4v	500mah	\$18.00

YAESU BATTERY INSERTS

FNB-3/3A	10.8v	500mah	\$28.00
FNB-4/4A	12v	500mah	\$27.50
FNB-10	7.2v	600mah	\$15.00
FNB-11	12v	600mah	\$30.00
FNB-12	12v	500mah	\$30.00
FNB-17	7.2v	600mah	\$18.00

MORE BATTERY INSERTS

Tempo S1 Early	270 mah	\$19.95
Tempo S2/4/5 Late	500mah	\$21.00
Standard BP-1	270 mah	\$19.95
Ten-Tec BP1	500mah	\$19.95
San-Tec #142/144 Tabs	600mah	\$22.00
Azden 300 Tabs	600mah	\$15.00
Bearcat	600mah	\$20.00
Regency MT1000 Tabs	600mah	\$15.00

ICOM Replaceable AA battery holder

BP-BH	\$20.00
BP-BH with 8 NiCad cells	\$26.00



SANYO 600MAH "AA" 1.50 each

ICOM complete packs

BP-3	8.4v	270mah	\$33.00
BP-5	10.8v	500mah	\$42.00
BP-7	13.2v	500mah	\$60.00
BP-8	8.4v	800mah	\$60.00
BP-7S	13.2v	1200mah	\$59.00
BP-8S	9.6v	1200mah	\$59.00

Super Packs For ICOM 2SAT, 4SAT, AND 24AT

BP83	7.2v	600mah	\$33.50
BP83-S	7.2v	750mah	\$38.00
BP84	7.2v	1000mah	\$50.00
BP84-S	7.2v	1400mah	\$60.00
BP85-S	12.0v	800mah	\$60.00

YAESU complete packs

FNB-10	7.2v	600mah	\$34.00
FNB-11	12.0v	600mah	\$52.00
FNB-12	12.0v	500mah	\$45.00
FNB-12S	12.0v	600mah	\$48.00
FNB-14	7.2v	1000mah	\$48.00
FNB-14S	7.2v	1400mah	\$59.00
FNB-17	7.2v	600mah	\$35.00

***FNB-2 10.8v 500mah \$19.00**



TNR YOUR BATTERY STORE

279 Douglas Ave.

Altamonte Springs, FL 32717

Shipping & Handling \$3.00

Florida residents must add 7% sales tax



QUICK, EASY, & COMPACT

Flash cards * NOVICE thru EXTRA * theory Key words underlined. Over 1000 sets in use! For beginner, OMs, XYLS & kids.

NOVICE	\$11.95
TECHNICIAN	\$10.95
GENERAL	\$ 9.95
ADVANCED	\$15.95
EXTRA	\$14.45

Shipping 1—\$ 3.00
2 or more —\$ 4.00
CLUB DISCOUNTS

Order Today!
from
VIS STUDY CARDS
P. O. BOX 16646
HATTIESBURG, MS 39402

CIRCLE 104 ON READER SERVICE CARD

High Performance Software by WA7RAI

DESIGN YAGIS THE EASY WAY.

WITH OUR HIGH SPEED YAGI MODELING PROGRAM

- 100% computer-generated yagis for non-tech users.
- Auto optimizer; optimum gain, F/B & bandwidth.
- Auto/manual modes. *2 - 12 elements to 500 mhz.
- Fastest analyzer available; calculates gain, F/B, and impedances in seconds (instantly w/math co-processor).
- Log or linear Ele. & Azi. polar plots w/ beamwidth.
- Easiest to use of all yagi modeling programs.
- Accuracy verified. *ARRL lab tested. *2 versions, for math co-processor & no math co-processor.
- Req. 360k & Hercules, CGA, EGA, or VGA graphics.

QUICKYAGI II.....\$40.00

For PC XT AT and Compatible 5.25" & 3.5" floppies. Add \$3.00 if outside U.S. and Canada. AZ orders add 5% state tax.
CALL SIGN REQUIRED W/ ORDER.

RAI ENTERPRISES, 4508 N.48th Dr.
Phoenix, AZ 85031 USA

CIRCLE 224 ON READER SERVICE CARD

FREE CATALOG-DEALER INQUIRES WELCOME ORDER TOLL FREE 800-346-0601 FAX 407-682-4469

CIRCLE 62 ON READER SERVICE CARD



what next?

by Carole Perry WB2MGP

Hamming It Up At The Museum

Several years ago I had the pleasure of meeting Michael Orofino W2KO at a local QCWA function. Both he and Bill KA2OVR have kept me up to date on the many wonderful events and achievements of Long Island, New York, ham radio clubs. The latest project these dedicated hams have gotten

involved with is of special interest to me because it allows children the opportunity to learn about radio in a fun way.

A group of ham radio operators from Long Island have established an Electronic and Radio Communication Center at the Science Museum of Long Island. The museum, a 22-room mansion on 40 acres overlooking Manhasset

Bay, is a non-profit organization. It offers consulting services to educators, staff development workshops, and hands-on training for teachers with limited science preparation.

The large house in which the Science Museum is located was built in 1906 by Robert Sizer, who was in the lumber business. He brought in all of the topsoil and plant material by barge.



Photo B. ERCC members raising money for the museum at a hamfest. Left to right are Mike W2KO, Ed W2KPQ, Herman W2TLC, Christine N2LXX, Kate AE2Z, Bill KA2OVR, Irv K2IRZ, and Milt W2ERJ.

The grounds which are still quite beautiful were originally laid out by a landscape architect. After Mr. Sizer passed away, the estate was purchased by Herman Goldman in 1927.

Mr. Goldman was the head of a well known marine law firm at 120 Broadway, and the brother of Albert J. Goldman, Postmaster of New York City for over 20 years. Mr. Goldman did considerable reconstruction and

decorating on the mansion. After his death in 1968, Mr. Goldman's estate was purchased by Nassau County as part of its land bank to protect it from being divided up as a housing development.

In 1973, the Science Museum of Long Island was fortunate to conclude an arrangement with Nassau County to lease this building, with the County maintaining the grounds of the 36-acre Preserve and its access to Manhasset Bay, Leeds Pond, and the woods and the streams that meander through the property.

A Rich Educational Resource

This winter, a group from the museum, including the director, Dr. John Loret, will go on a research expedition to Patagonia, Argentina. The ERCC at the museum has an active amateur radio station and will be in constant communication with the expedition.

The Electronics and Radio Communication Center is now teaching ham radio and electronics to beginners in



Photo A. The Science Museum of Long Island is also an exciting educational institute.

preparation for their Novice license. Its teaching staff will expand its program to teach with hands-on training, computers, satellite communication, packet radio, ATV, RTTY and other developments of the electronic age. The sights are set quite high for the expansion of the ERCC.

The museum presents 62 science programs to approximately 40,000 school children each year. On December 5, 1990, the radio group did a demonstration for 20 students and teachers who were attending classes at the museum that day. They made a wonderful contact with W5RRR, the amateur

radio station at the NASA Johnson Space Center in Houston, Texas. The students, with Alex AI2Q at the microphone, loved the fact that they could ask questions about the *Columbia* shuttle which was in orbit at the time.

The "Antique Radio and Electronic Section," ERCC's recent addition, are on display to be viewed by the museum's many visitors. The group has received many donations of antique radios and telegraph keys. All the items

Continued on page 25



Photo C. Christine Kim N2LXX, a senior at Hofstra University, is the first in her class to receive her Novice license. She recently passed her General theory and will soon take her code test.

NextDay

QSLs

Two-Color Rainbow Assortment

Call Today &

We Ship NextDay 2nd Day ASAP

Baraboo, Wisconsin
Sauk County

K9ZZ

Info \$1

Antennas West

1-800-926-7373

All orders ppd air mail USA. Canada add \$2
For overnight air delivery USA add \$10.
Box 50062-F, Provo UT 84605

CIRCLE 135 ON READER SERVICE CARD

Heart Attack.
Fight it with a
Memorial gift to
the American
Heart Association.

THE AMERICAN HEART
ASSOCIATION
MEMORIAL PROGRAM

1-800-242-8721

American Heart
Association

This space provided as a public service.

Budget QSLs

\$39/1000

plus \$3.75 Shipping in U.S.

★ RAISED PRINTED ★
BEAUTIFUL, GLOSSY INK

Thought you couldn't afford really good QSLs? These high quality RAISED PRINTED cards can be in your hands for only 4¢ each! Your choice of 4 colors of 67 lb. bristol stock: Gray, Yellow, Blue, Ivory. We print in blue ink in the format shown. If you don't want the state outline, we can remove it and make the call sign larger to balance the card. NO EXTRA CHARGE for ARRL logo, or extra wording if we have the room. Order with confidence, these are the best value in Ham Radio today! Your satisfaction is guaranteed. Send your check or call us if you have MasterCard or Visa. Need a custom card? Call (318) 443-7261.



DENNIS
WA5QMM

NETWORK
QSL CARDS

P.O. Box 13200, Dept. RF—Alexandria, LA 71315-3200
(318) 443-7261 or FAX your order to:
(318) 445-9940

Why buy a TNC?

PC HF FAX + PC SWL \$119

SPECIAL COMBINATION OFFER

For a limited time, if you order PC HF FAX \$99 (see our other ad in this issue), you can add PC SWL for only \$20 instead of our regular low price of \$99.00.

PC SWL contains the hardware, software, instructions and frequency lists needed to allow you to receive a vast variety of digital broadcasts transmitted over shortwave radio. All you need is any IBM PC or compatible computer and an SSB shortwave receiver. The product consists of:

Demodulator
Digital Signal Processing Software
80 Page Tutorial Reference Manual
World Press Frequency List
Tutorial Audio Cassette with Samples
PC SWL automatically decodes Morse code, Radio Teletype, FEC (forward error correcting code), SELCAL (selective calling transmissions), and NAVTEX.

PC SWL lets you tune in on world press services with up to the minute news, meteorological broadcasts, ham radio operators, coastal shore stations, aviation telex and much more digital action on the shortwave bands. Find all the utility station action you have been missing. PC SWL software uses the processor in your PC to do the work, why pay for another expensive box when a simple interface and your PC and do the job?

ADVANCED FEATURES:
Tuning Oscilloscope
Digital Waveform Presentations
Auto Calibration and Code Recognition
Continuously Tunable Filter Frequencies
Variable Shift
Adjustable CW Filter Sensitivity
Unattended Capture and Printing

Software Systems Consulting
615 S. El Camino Real, San Clemente, CA 92672
Tel: (714) 498-5784 Fax: (714) 498-0568

CIRCLE 244 ON READER SERVICE CARD

Say you saw it in Radio Fun

RF review

The Radio Shack VHF/UHF SWR-Power Meter

Larry R. Antonuk WB9RRT

Any ham who ventures off into the mysterious world of antennas soon finds that he needs an instrument capable of giving some indication of the health of his antenna system. You can measure continuity with a light bulb and a battery, but to really tell how sick your antenna is, you need a wattmeter. Not only can a wattmeter give an indication of the power level from your transmitter, it can also tell you how much power is coming back down from the antenna. This information can be quite useful during the antenna/transmission line troubleshooting process.

The problem with wattmeters is that accurate ones tend to be quite expensive. To combat this problem, hams back in the old days developed the VSWR bridge. A Voltage Standing Wave Ratio bridge does just what the name implies. It samples the voltage going to and coming from the antenna, and provides a ratio that indicates the status of the standing waves on the line. Ideally, you would like all of the transmitter's power to be going to the antenna, and none of it being reflected back down the line. This would be

expressed as 35W out, zero reflected, or as a VSWR of 1:1. This is also called a flat antenna system.

The problem with VSWR bridges is that nowhere in the name does the meter claim to know anything about power. It just expresses a ratio of the forward and reflected power levels. Your VSWR meter can tell you that everything about your antenna system is just fine (and it will be correct), but it can't tell you that your 35W mobile is only putting out 2W. For that measurement you need a wattmeter. Wattmeters, by nature, are frequency-sensitive devices and are accurate only in the bands they were designed for. It's OK to use that old CB VSWR bridge to measure VSWR on two meters—since VSWR is a ratio, the unit will be equally inaccurate in both directions and you'll come out OK. Power readings, of course, will be way off the mark. You didn't really think your 2m HT was putting out 67W, did you???



Photo A. The Radio Shack SWR/Power Meter.

You Do Need a Wattmeter

It's obvious, then, that you do need

a wattmeter to get the full picture of your antenna system, especially at

is usually calibrated in units that correspond to the SWR for a given power

VHF and UHF. A new addition to the Radio Shack catalog this year is the 19-320 VHF/UHF SWR-Power Meter. This palm-sized meter measures power on 144 and 440 MHz, and provides SWR readings as well. The unit is constructed in a die-cast aluminum housing and has two female UHF-style connectors (SO-239's). Two switches on the front cover select the power range (15W or 60W) and the SWR or POWER mode.

Those hams familiar with the classic version of the VSWR meter will immediately notice something missing on the Radio Shack model—the SET control. In a standard meter, the SET control adjusts the forward power reading to a reference point, usually full-scale. The meter is then switched to the reverse reading element, and VSWR is displayed as a percentage of the full-scale forward power. Rather than displaying a percentage, the scale

X-BAND TRANSMITTER

Miniature (2 1/4 x 3 3/4 x 1") GaAs microstrip transmitter provides 10 dBm centered at 10.525 GHz. Integrated microstrip patch antenna eliminates the need for an external antenna. Advanced matching techniques secured good temperature stability with low frequency pulling. Great for long-range testing of radar detectors, calibration of radar receiving equipment, and point-to-point communication links.

Complete Assembled System \$39.00
Parts & Instruction Kit \$29.00

Plus \$2.00 Shipping and Handling

INNOTEK Inc.

P.O. Box 80096, Fort Wayne, IN 46898
(219) 489-1711

Visa • MasterCard • Check • Money Order • COD
Money-Back Guarantee

CIRCLE 293 ON READER SERVICE CARD

Say you saw it in Radio Fun

G5RV All-Band QuicKits™

created by AntennasWest

Box 50062F, Provo, UT 84605

Fast & Easy to Build

- Fail-Safe visual instructions
- No measuring or cutting
- Everything included
- Finish antenna in minutes

Quality Components

- Presoldered Silver Fittings
- Kinkproof QuietFlex wire
- Fully insulated, wx sealed, no-corrode, low noise design

Tune All Bands incl WARC

Build your own from scratch. Order TechNote #124-C \$5.95 ppd USA
Call 801-373-8425 for Tech advice.

- Double Size G5RV 204 ft 160-10 Dipole \$59.95
- Full Size G5RV 102 ft 80-10 Dipole \$35.95
- Half Size G5RV 51 ft 40-10 Dipole \$25.95
- Quarter Size G5RV 26 ft 20-10 Dipole \$21.95
- Marconi Adapter kit \$11.95 converts any dipole to Marconi
- 200' Dacron 250# line \$11.95

Order Hot-Line: Add \$5 P&H

1-800-926-7373

CIRCLE 107 ON READER SERVICE CARD

World Ham Net Directory

New, 3rd Edition

Lists over 900 special interest ham nets. Tune in or work stamp collectors, airline people, missionaries, DXers, rag chewers, dozens more. Listed by interest, frequency, meeting time.

\$9.95 + \$2 s/h (\$3 foreign)

The Basic Guide to VHF/UHF Ham Radio

Propagation, equipment, antennas, repeaters, contesting, awards & more.

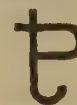
\$6.95 + \$2 s/h (\$3 foreign)

The Scanner Listener's Handbook How to Hear More on Your Scanner Radio

Explore 25-2000 MHz! Band allocations and users, scanners, antennas, accessories, listening laws, equipment, information sources, more.

\$14.95 + \$2 s/h (\$3 foreign)

Order now from your radio book dealer or



Tiare Publications

PO Box 493F
Lake Geneva, WI 53147

Catalog \$1, free with order

Visa/MasterCard

CIRCLE 119 ON READER SERVICE CARD

HELPING HAMS GET ON THE AIR! SINCE 1933

INFORMATIVE STARTER KIT INCLUDES:

- Novice and Tech Written Element Study Guide
- Practice Key and Oscillator
- Code Practice Cassette Tapes
- Theory Tapes
- FCC Rule Book
- Valuable Coupons Good Toward the Purchase of Ham Radio Equipment

PACKAGE PRICE — \$59.95

WHETHER YOU'RE AN "O.M." OR JUST A "NOVICE,"
QUEMENT IS SURE TO MEET ALL YOUR NEEDS!

QUEMENT
ELECTRONICS

PHONE (408) 998-5900

1000 S. BASCOM AVENUE • SAN JOSE, CA 95128

FEATURING LINES BY:



YAESU U.S.A.

ALINCO

AND THOUSANDS OF
ACCESSORIES!

CIRCLE 132 ON READER SERVICE CARD

ratio—1.1:1, 5:1, etc.

How does the Radio Shack meter work without this function? Instead of allowing you to calibrate the meter to whatever power level you happen to be using, the engineers at Radio Shack expect that you should adjust the power level of your transmitter to match the meter's SET level. Then, when you flip the switch to SWR, the meter will read a percentage of the recommended forward power (either 15 or 60W), and by reading the appropriate scale you can determine the SWR. This system works well, unless you're a QRP operator and only have a one watt transmitter to test your antennas with. In that case, you'll need to dig out that CB VSWR bridge that we discussed earlier. (There is a conversion chart on the back of the meter that lets you correct the SWR measurement for other power levels less than 60 but greater than 5W.) The decision to use a fixed VSWR SET level was most likely a trade-off for space—no adjustment pot means the unit can be that much smaller. This makes more sense in the long run, but some experimenters who have to have VSWR may need to calculate the VSWR from forward and reflected power readings.

But Can I Trust It?

The major parameter of concern with any piece of test equipment is its accuracy. Is the reading that you see a true representation of the power in the circuit? If not, how far off can it be? In other words, what is the tolerance of the measurement?

I performed various tests comparing the Radio Shack power meter with a Bird wattmeter and a commercial communications monitor (traceable to a national standard) on both the 2m and 440 MHz bands. These tests showed that the Radio Shack meter indicated as much as 20% higher power levels than that shown by my lab standard meters. Although this might seem like a fairly large error, it really isn't bad at all when you consider the errors incurred by much more expensive power meters.

It might help to put the Radio Shack unit in perspective. To begin with, the small size of the unit limits the actual readability of the meter. The meter movement itself measures 1.5" x 0.8", and the scale is divided by a single hash mark between, say, the 30W and 40W points. Even accounting for this, it should be noted that most professional wattmeters aren't highly accurate, and very few are actually traceable to a national standard. (The classic in-line wattmeter that everyone wishes he had has an accuracy of $\pm 5\%$ of the full scale reading.) Does this make the instrument useless? Of course not. What it means is that the instrument should be used in a relative rather than an absolute manner. As an example, you might measure the antenna system in your car after installing your new 440 MHz mobile. The SWR is quite good, but the unit is only putting out 40W, rather than the 45W that it's rated for. Rather than sending the mobile back to the factory for "low power," you need to adjust your thinking to compensate for the small inaccuracy in the meter. More importantly, you need to keep this reading in mind (or in a log) so that you can compare the reading with another taken six months later. If the later reading has dropped to 20W, you've got a problem. Likewise, a meter will allow you to compare two different transmitters and determine which one is putting out more power. Using the wattmeter in a relative mode and understanding the capabilities and limitations of the instrument will make it a valuable troubleshooting tool.

A Good Compromise

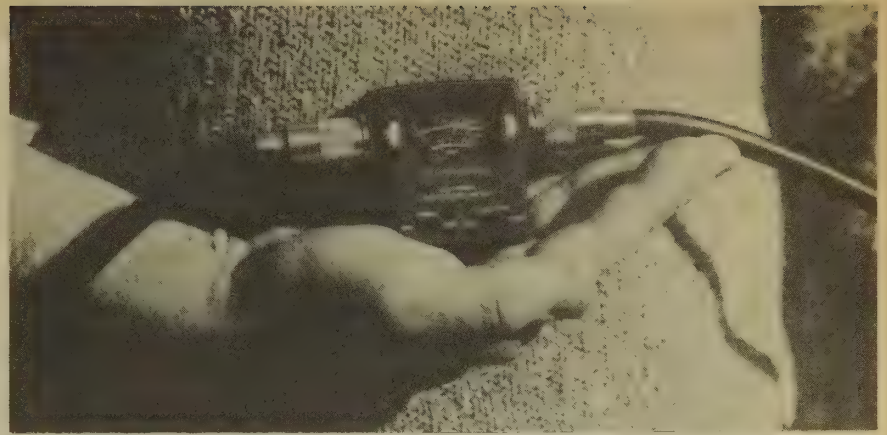
While the lack of a SET control and moderate accuracy may be of concern, these drawbacks are more than compensated for by the Radio Shack SWR-Power Meter's small size, quality construction and low cost. Its low insertion loss makes it a good candidate for a permanent position on the operating table (or dashboard), and its small size makes it likely to wind up in a toolbox or up a tower. Either way, the SWR-Power Meter is a very worthwhile investment. **RF**

specifications

Frequency Range
Measurable Power
Insertion Loss
Maximum SWR Measurement
Impedance
Dimensions
Weight

140 to 150 MHz, 430 to 450 MHz
2 ranges: 0 to 15W or 0 to 60W
0.3 dB
Up to 5:1
50 ohms
2-9/16" x 2-1/4" x 1-1/16"
5.3 oz.

Photo B. The SWR/Power meter in action.







DR-110



DR-570



DR-590



DJ-120T



DR-112



DJ-160T





DJ-460T

STANDARD **HUSTLER** rfconcepts **ARRL** **PC Electronics**

YAESU **TEN-TEC** **ICOM** **Larsen Antennas** **Ameco**

Outbacker Antennas **Cushcraft** **W5YI** **MFJ** **DIAMOND ANTENNA**

AEA **Nye-Viking** **Kantronics** **M² ENTERPRISES**

Ramsey Kits **TELEX hy-gain** **Bug Catcher** **COMET**

SPECIAL

CALL

For This Month's Special-Buy
Some Quantities Are Limited

CALL TOLL **1-800-70K-HAMS**

FREE **1-800-765-4267**



FREE SHIPPING UPS SURFACE (except towers/antennas)
Oklahoma Comm Center owned and operated, not affiliated with any other store.

9500 Cedar Lake Ave., Suite 100
Oklahoma City, Oklahoma 73114
Local & Info (405) 478-2866 FAX (405) 478-4202

Hours of Operation
M-F 10-6
Sat 10-3

1-800-666-0908
Pricing and orders only

YAESU ICOM ALINCO STANDARD

AEA, CUSHCRAFT, KANTRONICS, ASTRON, DIAMOND, Etc.
FACTORY AUTHORIZED DEALER—LOW DISCOUNT PRICES
FULL LINE OF ACCESSORIES—MONTHLY SPECIALS

LENTINI COMMUNICATIONS

21 Garfield St., Newington, CT 06111

New equipment pricing and orders 1-800-666-0908 Out of State.
Tech questions, used gear, info 203-666-6227. Fax: 203-667-3561.
Hours: Mon-Fri, 10-6. Sat, 10-4

WE SHIP UPS
C.O.D.s
WELCOME

VISA

DISCOVER



CIRCLE 234 ON READER SERVICE CARD



\$39.95

AMERICAN RAINBOW

Unique dimensional designs printed in a red and blue rainbow blend on white 80lb Yellum Bristol. Send S.A.S.E. with 2 stamps for samples or order 1000 now by sending a check for \$39.95 along with all your particulars. Minnesota residents please add 6% sales tax. Please make checks payable to Denny Johnson and allow 2 weeks for delivery. We guarantee that you'll be pleased!

New Dimension QSL

6500 Lucia Lane, Minneapolis, Minnesota 55432 (612) 971-3861

High Performance Software by WATRAI

WHY SPEND BIG BUCKS ON AN ELECTRONIC KEYSER?

Turn your PC/XT/AT computer into a powerful autokeyer
•Lambic compatible •Standard or Farnsworth •5 to 40 wpm
•9 programmable TX buffers •Programmable macro keys •Auto Sn
•4 prog. time zone clocks •DXCC w/ beamhead
•10 min ID timer •200 year calendar •LPT1/2 req'd •More!
•DB-25 interface (paddle key in & TTL Tx key out) included

AUTOKEY PLUS...\$30.00

For a few more \$\$\$, add a super Autolog with
•Scrolling log display w/ spreadsheet-type entry •Print single/batch QSL reports and mailing labels
•Auto Prefix/Call/Country/ State/ Special Search •Sort/Search/Modify all records
•QSL tracking •Auto Country Entry •Print log needs (all or sort)
•Very user-friendly •Autokey and autolog are fully integrated into one
•Dual clock cal

AUTOLOG PLUS II...\$45.00

AUTOLOG PLUS...\$25.00

To order the above programs w/ Kenwood™ TRX Control (CAT) add \$10.00 to price and indicate "X" after prog. name

For PC/XT/AT and Compatible. 5.25" & 3.5" floppies. Add \$3.00 if outside U.S. and Canada. Az. orders add 5.5% state tax

CALL SIGN REQUIRED W/ ORDER. *Requires computer ready transceiver

RAI ENTERPRISES, 4508 N. 48th Dr.
Phoenix, AZ 85031 USA

CIRCLE 279 ON READER SERVICE CARD

Enjoy NEVER CLIMBING YOUR TOWER AGAIN

Are you too scared or too old to climb? Never climb again with this tower and elevator tram system. Voyager towers are 13 and 18 inch triangular structures stackable to any height in 7 1/2", 8 3/4" or 10" section lengths. Easy to install hinge base, walk up erection. Next plumb tower with leveling bolts in base. Mount rotor and large heavy beams on Hazer tram and with one hand winch to top of tower for normal operating position. Safety lock system operates while raising or lowering. At last a cheap, convenient and safe way to install and maintain your beam. This is a deluxe tower system that you can enjoy today.

SPECIAL TOWER PACKAGE: 50 ft. high by 18" face tower kit, concrete footing section, hinged base, HAZER kit, Phillystran guy wires, turnbuckles, earth screw anchors, 10' mast, thrust bearing, tool kit, ground rod and clamp, rated at 15 sq. ft. antenna load @ 100 MPH, \$1974.95.

50' by 13" wide tower, same pkg as above \$1670.95
HAZER 2 for Rohn 25-hvy duty alum 12 sq ft wind ld \$24.95
HAZER 3 for Rohn 25-std alum 8 sq ft wind load \$22.95
HAZER 4 for Rohn 25-hvy galv std 16 sq ft wind ld \$35.95
TB 25 Ball thrust bearing 2" max mast dia \$4.95

NEW NEW NEW NEW NEW NEW \$60.00
HAZER 2 for Rohn 25-hvy duty alum 12 sq ft wind ld \$24.95
HAZER 3 for Rohn 25-std alum 8 sq ft wind load \$22.95
HAZER 4 for Rohn 25-hvy galv std 16 sq ft wind ld \$35.95
TB 25 Ball thrust bearing 2" max mast dia \$4.95

Satisfaction guaranteed. Call today and order by Visa, M/C or mail check. Immediate delivery.

Glen Martin Engineering, Inc.

Dept. A
RR 3, Box 322,
Boonville, MO 65233
816-882-2734
FAX: 816-882-7200



CIRCLE 72 ON READER SERVICE CARD

SCARED OF THE CODE?

IT'S A SNAP WITH THE
ELEGANTLY SIMPLE MORSE TUTOR
ADVANCED EDITION FOR BEGINNERS TO
EXPERTS — AND BEYOND

Morse Code teaching software from GGTE is the most popular in the world—and for good reason. You'll learn quickest with the most modern teaching methods—including Farnsworth or standard code, on-screen flashcards, random characters, words and billions of conversations guaranteed to contain every required character every time—in 12 easy lessons.

Sneak through bothersome plateaus in one tenth of a word per minute steps. Or, create your own drills and play them, print them and save them to disk. Import, analyze and convert text to code for additional drills.

Get the software the ARRL sells and uses to create their practice and test tapes. Morse Tutor Advanced Edition is approved for VE exams at all levels. Morse Tutor is great—Morse Tutor Advanced Edition is even better—and it's in user selectable color. Order yours today.

For all MS-DOS computers (including laptops). Available at dealers, thru QST or 73 or send \$29.95

+\$2 S&H (CA residents add 6% tax) to:

GGTE, P.O. Box 3405, Dept. MF,

Newport Beach, CA 92659

Specify 5 1/4" or 3 1/2" inch disk

(price includes 1 year of free upgrades)



CIRCLE 193 ON READER SERVICE CARD



upgrade... don't stop now!

by Gordon West WB6NOA

Books and Question Pool Changes

Thinking about upgrading your theory? If so, let's talk about the upcoming dates for changes in the amateur radio question pools.

Novice and Technician class question pools are officially called FCC Elements 2 and 3A—2 for the Novice, and 3A for the Technician. They haven't changed much over the last few years, and the next change won't be until the middle of 1993. So what you now have—or what you will probably soon get—is good for the next couple of years.

The General class question pool, called Element 3B, hasn't changed much except for one thing: Letter-number-letter combinations are now spelled out in exact words on the General

keep blowing.

If you really want to abuse yourself, ask the computer to give you only those questions which you have missed before. That's a quick way to get a handle on what you need to learn in order to prepare yourself for the upcoming test. Then, at the end of the day, call up your graphics and see for yourself, on-screen and in living color, your progressive march to excellence.

W5YI Software

One of the best self-testing pro-grams I have tried comes from Fred Maia, W5YI Publishing, P.O. Box 565101, Dallas TX 75356-5101 (817) 461-6443.

Fred Maia W5YI and Steve Sternitzke NS5I have developed this \$30 program that is available in both small or large

disk format for the Novice, Tech, General, Advanced, and Extra question pools—and you get them all. Each disk includes every possible test question and the four multiple-choice answers for each question.

You can take the sample ham tests right at your IBM-compatible keyboard, on-screen, or you can print out the tests and take them on paper. After entering your answers into the computer, a prompt will tell you whether or not you got the answer correct. The computer tabulates your score both in numbers



Photo A. With the right software, preparing for a ham test on the computer can be fun.

and percentage correct. The software also includes a copy of Part 97 so that you can review your rules and regulations.

This is the same type of software that Fred and Steve issue to their examination teams, so you are assured of getting the right stuff that will be covered on your exam. But nooooo, there's not a chance you'll ever get a sample exam that will be the same as your real exam. The number of different tests you can make from the questions in the question pool are myriad. But the appearance of the test will be the same!

If you just want to study the question pools on paper, you can order any individual question pool for \$3.00 each, or receive the combined Novice and Technician question pools for the new no-code ticket for \$4.95 each. These also come from the W5YI Publishing group.

and percentage correct. The software also includes a copy of Part 97 so that you can review your rules and regulations.

This is the same type of software that Fred and Steve issue to their examination teams, so you are assured of getting the right stuff that will be covered on your exam. But nooooo, there's not a chance you'll ever get a sample exam that will be the same as your real exam. The number of different tests you can make from the questions in the question pool are myriad. But the appearance of the test will be the same!

If you just want to study the question pools on paper, you can order any individual question pool for \$3.00 each, or receive the combined Novice and Technician question pools for the new no-code ticket for \$4.95 each. These also come from the W5YI Publishing group.

The Lanz Company

The Lanz Company in Louisville, Kentucky, (502) 895-1377, also offers theory computer disks, as well as a video tape that contains all of the question pools on individual VCR tapes. Bob Lanz N4ISL is a regular hamfest attendee, and he wants to see as many new students upgrade on the computer as possible. All Lanz programs are compiled on stand-alone IBM PC-type disks, and documentation is also included on how to install the programs in a hard drive. He is also one of the few that offers programs for the Commodore 64 with compatible drive and monitors.

Diamond Systems

At Diamond Systems, Roger Wayman W9TYT offers question pool disks, but with a twist—he has narrated an explanation after some of

Theory by the Tube

Studying the paperbacks is certainly a good way to prepare for an upgrade examination. But did you know that all of the question pools are on diskette, too?

Studying questions from a computer can be downright fun! First, let the computer build you a typical test for the particular element you are planning to upgrade to. Next, complete the test on the computer, and then check your score. You missed how many?

The computer then goes on to a new examination, but it might automatically include those questions you blew on your second test. Take the test, calculate your score, and then go on for another exam. All the while, your computer keeps track of your progress, and keeps hitting you with those examination questions you

VIEW from Spangler EXPRESS

500 ONLY \$62.50

Actual Size: 5 1/2" x 3 1/2"

BOTH WITH CUSTOM REVERSES AND OVERPRINTS AT NO EXTRA CHARGE! QUANTITY DISCOUNTS AVAILABLE

For Info Kit and Full Price List: P.O. Box 6362, Kansas City, KS 66106 or Call Toll Free 1-800-466-1616 Ext. #265

CIRCLE 103 ON READER SERVICE CARD

FULL COLOR CUSTOM EYEBALL CARDS

500 ONLY \$44.00

Actual Size: 3 1/4" x 2"

KABJSK
AMATEUR RADIO IS
BIG IN SEATTLE!

the more difficult questions. Similar to the Gordon West theory books and Ameco theory books, you see a question, the four possible answers, the right answer, and then AN EXPLANATION! Give Roger a call at (312) 763-1722, and he and his dad will tell you all about their brand new combined Novice and Technician theory diskette specifically for the new no-code license. He has so much information packed on one disk, all of the other upgrade disks must be purchased separately. The only thing not on the screen are the individual schematic diagrams and electronic component symbols. For these, you look at the accompanying paperwork, or consult your regular theory book.

QSO Tutor

QSO Tutor (Kennett Square, Pennsylvania; [215] 347-2109) is a colorful theory program, distributed by MFJ (Mississippi State, Mississippi, [601] 323-5869). This is probably the ultimate in colorful upgrade preparation on an IBM-type computer at about \$30 for each individual element. You can work with the entire question pool, or select certain areas of the question pool, or automatically select those questions which you have missed before. There are plenty of graphics on the program—including full-screen schematic diagrams that others had to resort to paper to get down. This is what makes his program a little bit more expensive than the others—added graphics which took a long time to digitize and come up on the screen in living color. Of course, you could run the program in mono, too.

Originally the program was sold exclusively by QSO Tutor, but sharp-eyed Martin at MFJ spotted a terrific program in the making and took over distribution for this product. You might want to write MFJ for their new 1992 catalog, and be sure to check out their "upgrade" departments.

Updates

The question pool committee is presently working on Element 2 and Element 3A syllabi. It's the syllabi that provide the framework for the questions within an individual element. The question pool committee, made up of lead volunteer exam coordinators, will release the Element 2 updated syllabus on February 1, 1992. This will allow individual hams to have four months to submit questions within this framework to the Element 2 and Element 3A question pools.

On July 1 of next year, the question pool committee works on Element 2 and Element 3A questions, and releases these questions for final review on December 1st. On January 1, 1993, the question pool committee will furnish written copy of the new Novice and Technician element question pools, and disk-makers and publishers will begin to update their books by May 1st. On July 1, 1993, the new revised Novice and Technician written questions will go into effect, and there will be plenty of new questions and answers out there in public domain for everyone to get started for Novice or Technician.

So, if you are looking for a new way to prepare for your upgrade, do consider sitting in front of the tube. It's a lively way to prepare to pass the tests. **RF**

what next?

Continued from page 21

are displayed with the contributor's name.

Members from the Long Island QCWA Chapter 81 spearheaded the project with help from members of LIMARC, Nassau, and Suffolk radio clubs. The members of the ERCC Committee are Ed W2KPQ, Mike W2KO, Bill KA2OVR, Sid K2LJH, Alex A12Q, Kate AE2Z, Milt W2ERJ, and Herman W2TLC. For additional information, contact the Science Museum of Long Island, Attn.: ERCC, 1526 N. Plandome Road, Manhasset NY 11030.

As a teacher myself of 6th, 7th and 8th graders, I am always on the lookout for new and exciting ways to present ham radio lessons. Taking youngsters to a hands-on museum like this one is an excellent way to excite the children's imaginations and stimulate excellent discussions. Ham radio instructors of children or adults should take advantage of local museums that can provide experiences that motivate learning. **RF**

Generous Hams

Continued from page 1

Without ever having met George personally, and without knowledge of the gift, Nick took the exam and passed with a 100% score. (I view this as an indication that George must have been helping him.) After passing the exam, the head examiner, Charles Roy WS6F informed Nick of the bequest.

When he went to take the test, Nick was firmly committed to never having anything to do with that awful Morse code. Before leaving the exam site, he announced that he would be back soon to take the code test.

Nick, his brother Tony KC6YSB, and I were all taken aback by this act of kindness from a person whom we never knew. Even so, we shall always remember him. We are also all committed to follow in George's footsteps and return to ham radio a portion of what it has given to us.

PR for Ham Radio

To maintain a favorable public image of hams and amateur radio, Joseph Phillips K8QOE, Public Information Coordinator of the *Ohio Section Journal*, gives a list of 10 items which would annually generate news stories in your local newspapers or radio and TV stations:

1. Ham of the year (selected by your club).
2. New officers elected for the year.
3. Field Day activities (prior to event).
4. Local hamfest or other social event.
5. Ham participation in local civic event (parade, marathons, bike-a-thons, etc.).
6. Local ham radio classes.
7. Unusual QSO or unusual QSL card received by a member (Don't write this one up as a press release. Call a reporter and sell the story.)
8. Local club president or PIO commenting on pending federal or local government legislation.
9. Field day statistics after the event.
10. Story about a ham speaking to local civic group or at a school activity.

Your ham radio activities could be covered by your local media just about every month! It takes effort, Phillips notes; you can't wait for reporters to call you. You have to generate your own stories for press releases. You need a PIO (Public Information Coordinator) in your club, and when he asks for help, he needs the cooperation of club members.

The public needs to know about amateur radio and what hams are doing. This will safeguard amateur radio's reputation when the occasional negative story is published, and when legislation threatens to reduce our privileges.

K8QOE notes that new laws passed to regulate electronic devices could affect amateur radio, and he gives Ohio House Bill 348 (intended to regulate commercial cellular towers in his state) as an example. The effect of such legislation on amateur radio will be more readily taken into account if the general public, including the lawmakers, are aware of the value of amateur radio as a public resource. *TNX NOARS LOG*, Oct. 1991. **RF**



Listen to
"Let's Talk Radio"
7 nights a week
6pm to 12 pm on
Spacenet-3,
Transponder-21,
Audio 6.2

VHF COMMUNICATIONS

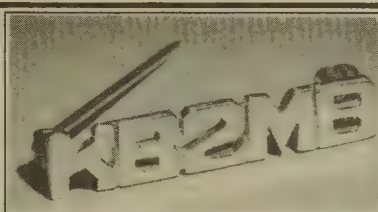
9:00 am - 5:30 pm weekdays

Weekends and evenings by appointment.

**280 Tiffany Avenue
Jamestown, New York 14701**

Western New York's finest amateur radio dealer.
PH. (716) 664-6345
(800) 752-8813 for orders only

CIRCLE 14 ON READER SERVICE CARD



Call Sign Jewelry Shows Your Pride

14 Karat Gold jewelry and gifts with your Call Sign. Collar pins, necklaces, tie pins, lavalieres, charms, Operator Rings, Call Sign Watches. Look great! Quality craftsmanship. Send for free catalog:

KB2ME, HAM Jewelry, 26 Edgecomb Road, Binghamton, NY 13905-4017. 800-285-8587.

CIRCLE 64 ON READER SERVICE CARD

MODIFICATION BIBLE

NEVER BEFORE IN IT'S TIME, SO COMPLETE!
CALL TOLL FREE 1-800-256-9895
PRICE: \$29.95 + COD FEE OR
MAIL MONEY ORDER OR CHECK TO
KDC SOUND-5 PINE ADELOW-CONROE,
TX. 77303

OVER 200 PAGES \$29.95 and save
OVER 50 COMPLETE SYNTHESIZED CRYSTAL CHARTS.
OVER 20 ARE PRECALCULATED MODIFICATION CHART
OVER 100 MODIFICATIONS FOR PLL C.B.S.
OVER 100 HAM RADIO MODIFICATIONS.
OVER 60 PLL DIAGRAMS.
TEN METER MODIFICATION.
SCANNER MODIFICATION.
INCLUDING: COBRA, RCI, RANGER, UNIDEN, ALINCO, AZDEN, ICOM, KENWOOD, ETC.
+ SCANNER MODIFICATION.
THIS BIBLE IS FULL OF INFORMATION AND DIAGRAMS EASY TO READ.
PRICE: \$29.95 NO SHIPPING COST EXCEPT COD FEE

FREE W/PURCHASE IF MODIFICATION BIBLE
ELECTRONICS AT DISCOUNT

CIRCLE 151 ON READER SERVICE CARD

HUGE NEW CATALOG

Call or write Universal today to receive your free 92 page catalog with prices!

- Communications Receivers
- Portable Receivers
- Amateur Transceivers
- Amateur & SWL Antennas
- Scanners
- RTTY and FAX Equipment
- Books and Manuals
- All major lines: Kenwood, Icom, Yaesu, Alinco, MFJ, Japan Radio, AEA, Sony and Sangean.

This catalog is available FREE by fourth class mail, or for \$1 by first class mail.

Universal Radio
1280 Aida Dr. DEPT. RFUN
Reynoldsburg, OH 43068
◆ Tel. 614 866-4267
◆ Tel. 800 431-3939
◆ FAX 614 866-2339

Universal-quality equipment since 1942!

MAKE CIRCUIT BOARDS THE NEW, EASY WAY



**WITH TEC-200 FILM
JUST 3 EASY STEPS:**

- Copy circuit pattern on TEC-200 film using any plain paper copier
 - Iron film on to copper clad board
 - Peel off film and etch
- convenient 8 1/2 x 11 size
With Complete Instructions

SATISFACTION GUARANTEED

5 Sheets for \$3.95 10 Sheets only \$5.95
add \$1.50 postage NY Res. add sales tax

The MEADOWLAKE Corp.

Dept. AZ, P.O. Box 497
Northport, New York 11768

GO WITH THE WORLD LEADER IN LOGGING SOFTWARE!

The WB2OPA LogMaster

HF Logging System for PC Compatibles

- ◆ QSY and Send DX Spots From DX PacketCluster Window.
- ◆ Kenwood, Icom, and Yaesu Riggs Supported.
- ◆ Import K1EA CT (Or Any Other Format Upon Request).
- ◆ Auto "Needs" Indicator As You Enter Log Information.

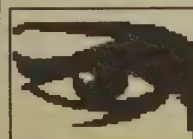
- ◆ Used By The Gordon West Radio School.
- ◆ Featured At The W5MIR Space Exhibit.
- ◆ Simple To Operate, Full Featured, and Very Powerful.
- ◆ 30 Day Money Back Guarantee.

\$69.95 Complete, Demo Disk \$5.00 (Refundable With Purchase)

Sensible Solutions

P.O. Box 474, Middletown, NJ 07748, U.S.A. Tel: 1-800-538-0001
Outside Of U.S. And Canada: (908) 495-5066

VISA And MasterCard Accepted
"Professional Software For The Radio Amateur - The Difference Is Clear To See"
European Distributor: L.E. Reimers Box 213, S-261 23 Landskrona, Sweden Tel: 0418-13926





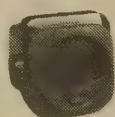
DAIWA'S Quality Continues...
Proven Reliability for Today's Amateur.

Cross Needle and Digital SWR/Power Meters for All Brands

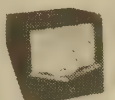
Rugged, Efficient, Low Cost answer to SWR/Power measurement that fits well into any station.



Model	Freq. Range Int. Sensor	Forward Power	Connectors
Cross Needle			
CN-101	1.8-150MHz	15/150W/1.5kW	SO-239
CN-103	140-525MHz	20/200W	SO-239 or N
NS-660A/PA	1.8-150MHz	30/300W/3kW	SO-239
NS-663BM/BN	140-525MHz	30/300W	SO-239 or N
Digital			
DP-810	1.8-525MHz	0-1.5kW/0-15W	SO-239 or N
DP-820	140-525MHz	0-150W	SO-239 or N
DP-830	1.8-150MHz	0-1.5kW	SO-239
Mobile			
CN-410M	3.5-150MHz	15/150W	SO-239
CN-460M	140-450MHz	15/150W	SO-239
CN-465M	140-450MHz	15/75W	SO-239
CN-520	1.8-60MHz	200/2000W	SO-239



CN-410M



CN-520

Coaxial Switches

	CS-201	CS-201GII	CS-401	CS-401G
	2 Position	2 Position	4 Position	4 Position
Frequency:	500MHz	1.3GHz	800MHz	800MHz
Connectors:	SO-239	N type	SO-239	N type
Isolation:	+60 dB	+60 dB	+50 dB	+50 dB
Power Rating:	2.5kW PEP 1kW CW	2.5kW PEP 1kW CW	2.5kW PEP 1kW CW	2.5kW PEP 1 kW CW



CS-201

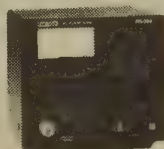


CS-401

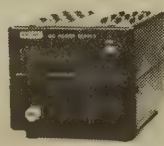
Power Supplies

Daiwa power supplies use the latest hi-tech circuitry and components providing reliable, regulated DC Power. Short circuit protection protects the power supply in the event of accidental shorting. Crowbar protection protects your rig in the unlikely event of power supply failure. All Daiwa Power Supplies are 120V 50/60 Hz. Also available 220V 50/60 Hz.

Model	PS120M	PS140II	PS304	RS3080	RS40X
Voltage	3-15	13.8	1-15	1-15	1-15
Current(ICS)	12A	14A	30A	33A	40A
Current(Cont.)	9.2A	12A	24A	30A	32A
Ripple(Max)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	1%
Cooling Fan	NO	NO	NO	YES	YES
Size(inches)	5x4x9	5x4x9	7x6x9	7x6x9.5	11x5.5x9
Weight(lbs.)	11	11	16	21	22



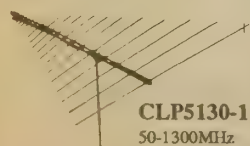
PS-304



PS-140II



CREATE is serious about long term reliability. The CREATE Family of Rotators, Roof Top Towers and High Gain Antennas were designed with the serious DX'er in mind.



CLP5130-1
50-1300MHz

This high gain, wide-band VHF/UHF antenna is excellent for DXing, Amateur radio, FM broadcast, scanners, VHF/UHF television, government, cellular and business band use. The forward gain is 10-12 dB, front to back ratio 15 dB, 23 elements, transmit power to 500 watts. Boom length 5.8ft., VSWR 2.0:1 or less, max. Longest element 9.8ft., weight 11 lbs. wind survival 90 mph. CLP5130-2, 105-1300MHz also available. 19 Element Boom 4.6 ft., Longest Element 4.6 ft.

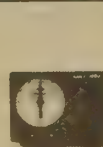


High grade aluminum Roof Towers for your antenna requirements. Guying is recommended to insure safety.

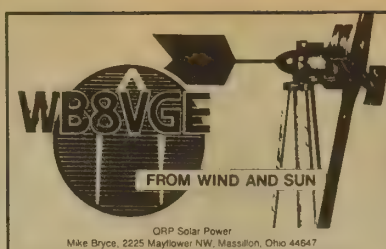
Model	Height	Base Width	Max. Wind Load Ft ²	Max. Vert. Load Lbs.	Weight
CR18	5'10"	31 1/2"	21 @ 90 mph	440	18
CR30	9'10"	39"	27 @ 90 mph	1,322	33
CR45	14'9"	39"	23 @ 90 mph	881	57

Features of the RCS series:

- Cast and machined aluminum case
- Worm drive brake gearing
- Auto, mast clamp guides
- Reverse Delay Control (RDC)
- Preset (on 3 models)
- Water tight connector
- Circle overlay available for U.S.A. (west-central-east)
- Long term reliability



Electronic Distributors Co.
325 Mill Street N.E. • Vienna • VA 22180
Ph 703-938-8105 FAX 703-938-6911
Contact Your Favorite Dealer For Details



radio magic

by Michael Bryce WB8VGE

How About Some Milliwattting?

When looking for gear, we sometimes stumble across QRP (low-power) transmitters. While the majority of hams don't talk on a transmitter of less than 200 watts input power, a few brave souls do just for the challenge. If you're up to it, and like to save a buck here and there, try QRPing!

Maybe it's for the challenge of doing things a bit differently from the rest of the crowd. Maybe it's the thrill of working DX with a transmitter you built from a handful of parts. Maybe it's just FUN! What are we talking about? QRP—the art of low-power communications.

As a "Q" signal, "QRP" was created to mean "Shall I reduce power?" Enthusiasts of low-power amateur radio operation adopted it, and after much debate, it came to mean "5 watts or less output on CW or 10 watts PEP output on SSB." Operating on power levels under 1 watt is called "milliwattting." This term replaces the older term "QRpp."

The QRP Advantage

The QRP operator uses equipment that weighs less, takes up less space, costs less, and is less dependent on commercial power. The QRP operator has freedom. This freedom makes it possible to carry a complete amateur radio station in the corner of a backpack. You can operate a QRP station from a pack of batteries carried in a shirt pocket for days; or you can operate indefinitely from hydroelectric, wind, or solar power systems. There are many QRP stations operating for Field Day with only one old car battery as the power source for a full 27 hours!

As an added bonus, TVI is pretty rare while running QRP. It would not bother me in the least to fire up the

QRP rig during the Super Bowl. I know of not one single case where "quiet" hours have been imposed on a QRP operator because of TVI. Move the 2 kW amplifier to the floor and use it to keep your feet warm during the winter.

Good Start in Home-Brew Projects

Few very of us can sit down and build an ICOM IC-781 from scratch. QRP, on the other hand, is one of the few areas in amateur radio where the average ham home-brewer can still make a decent showing. In fact, you could go to the local Radio Shack right now and bring home enough parts to build an 80 meter CW transmitter. Even if you've never held a soldering iron before, building a QRP transmitter is a simple project.

Many QRP transmitters consist of a few transistors, coils, and standard resistors and capacitors; nothing more! Since most QRP operation is in the HF bands (80 through 10 meters), layout is not particularly critical. Since a fair amount of QRP operation takes place on certain frequencies, crystal control of the transmitter is not as bad as it sounds. Simple VXO circuits allow for moving the crystal's frequency around a bit. Many QRP projects use VFOs and offer full QSK to boot!

Now don't get the idea that running QRP means operating with inferior equipment! Nothing can be less true. Granted, you won't be able to cram an IC-781 into a matchbox, but that's not the idea. Receivers for QRP use are usually as good as the station receiver—sometimes better! There are limits as to how much performance you can expect from a receiver using minimal circuitry. The old saying, "You can't work 'em if you can't hear 'em," applies to QRP as well as DX. There

are many hams who have worked DXCC running less power than a flashlight while having the time of their life.

Join the Club!

QRP provides the ham with an outstanding array of things to do and say. No matter if you're into nets, DX, contests, awards and home-brewing—they are all part of QRP.

Does all of this talk of QRP pique your interest? There are many clubs devoted to low-power communication. The oldest is the QRP ARCI, with over 7,000 members. If you would like more information about joining the QRP ARCI, drop me a note (see my address at the end of this column). I'll send you a sample of *The QRP Quarterly* and membership forms. Once you're a member, it's for life. The only cost is for mailing *The Quarterly*.

Check around and you may come up with some bargains in low power equipment. Ten-Tec's Argonaut series transceivers (the 505, 509 and the 515) are excellent to use, even for the newcomer. A good receiver and ample RF power (for a QRP rig) will net you many a contact, with the least amount of dollar output.

Another good buy is the Heath's QRP rigs: the HW-7, -8, and -9. The HW-7 has the worst receiver of the trio, but it is usable. The HW-9 has the superhet receiver and will cover all the bands, provided the band kit was installed by the builder. Note, however, that the Heathkit rigs are no longer being made, and all were in kit form at one time. Look them over real closely before you plunk your money down on the table. And get the manuals! **RF**

You may contact Michael Bryce WB8VGE at 2225 Mayflower NW, Massillon, OH 44647.



Alice Coppock, KC6VYI—"Very Young Individual"—is a nine-year-old Technician with her sights on a General ticket and Worked All States Award. When not collecting states on 10 meters, she contacts her mom, KB6OGM, and dad, N9EPY/6, on her 2m HT. Alice also checks in regularly on the 2300 Zulu net Monday through Saturday, at 28.390. This informal net, dedicated since 1988 to helping the amateur radio community, is open to all stations.

Beam in the Briefcase?

The kind of business trips I take, you gotta have a beam to get a signal back home. But the hotels don't go for aluminum antlers on the roof. No problem with my good old HalfSquares. They're smaller than a book in the briefcase, and inconspicuous when they're hanging out the window to a tree, but they do the job barefoot without raising an eyebrow. Add \$5 P&H to your order.

10 M \$39.95 15 M \$44.95 20 M \$49.95 40 M \$69.95

AntennasWest

Box 50062F, Provo, UT 84605

Build your own from scratch with TechNote #122A \$5.95 ppd USA

Order Hot Line

800-926-7373

CIRCLE 90 ON READER SERVICE CARD

TO ADVERTISE
IN THE
RADIO FUN
FLEA MARKET
CALL
SUE COLBERT
1-800-225-5083

Extra Accomplishment

Dan Savio of Ridgewood, New Jersey, passed his amateur Extra Class license exams last fall and received the call-sign AA2GM. While many amateurs reach Extra Class status, Dan has achieved the feat at the age of 10. He has joined a select group of rare individuals!

Dan is a member of the Fair Lawn Amateur Radio Club (NJ), where he took his Novice class and worked his first contact, an amateur in Argentina.



Photo A. Dan Savio AA2GM, a 10-year-old ham with many interests.

Besides amateur radio, his hobbies include model rocketry, aeromodeling, computers, rocks and minerals, and the violin. Dan says that he'd like to be-

come an astronaut when he gets older. He loves to work CW, and he says that he now wants to get involved in learning about digital communications and OSCAR. "I think amateur radio is great," Dan says. "I wish more kids would get involved in it."

Dan comes from a family of amateurs. His 13-year-old sister, Caroline, holds the callsign KA2NOZ, and his father is CX6AQ (Uruguay) while awaiting his U.S. license. TNX Ed Efcak WX2R!



Photo B. A family of hams in Greece: SV5YS, SV5AYL, SV5TS, SV5AFS, and SV4AHS. TNX KDØJL.

The Truth . . . About Electronics

[Excerpt lightly edited from the "Moderator" via the "Broward Amateur Radio Club Bulletin." The specific author was not named.] As a newly licensed amateur radio operator studying to upgrade my privileges, I had a very hard time comprehending different electronic terms. I did a lot of research in my local library and discovered some little known facts.

One of the most often used and least understood terms is VSWR. VSWR is a contraction of VEESWAR. The VEESWAR is a small creature that lives in coaxial cable. VEESWARs look like a cross between the Munchkins and Dopey. They're so small they can only be seen with a scanning electron microscope. The VSWR ratio shows how many VEESWARs will feed on a single WATT of power. A well nourished VEESWAR needs to consume only a single WATT to remain healthy. VEESWARs that are not taken care of require more WATTs to stay alive. For example, a community of VEESWARs that consume three times the necessary number of WATTs has a ratio of 3:1. But a community of

VEESWARs that consume only what they need for survival will provide a ratio of 1:1.

WATTs are also small creatures that travel through your coax to feed and graze. These cattle-like animals are very lazy, and will take the easiest route available to obtain their food, which they call "ground." Ground-round is a favorite food of Humans. In the same manner, ground-loops are a delicacy for WATTs. In order to obtain this sweet treat, WATTs will blow a hole in the side of your coax. WATTs were given their name by someone who asked, "How much power does an amateur handheld take to access a repeater?" When told the amount of power, he responded, "WATT?" The name and spelling took.

Many hams believe that their ANTENNAS actually send their signals into the atmosphere, to bounce off the ionosphere and eventually end up in some foreign land. Nothing could be further from the truth. ANTENNAS are actually cleverly designed devices that tap the combined energy of being. This energy was best described as the FORCE in the Star Wars trilogy. When

WATTs travel through your coax, evading the hungry VEESWARs, they are sent by your ANTENNA into another dimension. There they wander aimlessly until they are sucked back into this dimension by someone else's ANTENNA.

Another term is dB. When English was being formed from German origins, the term Hammer and Dumbbell were interchangeable. As the science of electrons was developed, early experimenters looked for a term that would describe the level of power being absorbed by their ANTENNA. The level of received energy is equated as "being hit by a sledgehammer." An S-UNIT refers to the sledge factor. Anything over an S-9 (equal to a nine-pound sledgehammer) is given in dB. So a 20 over 9 would be equivalent to a nine-pound sledgehammer plus 20 dumbbells. Understanding these terms will help hams run their stations much more efficiently. This keeps other dimensions uncluttered and our VEESWARs in good health. It also prevents sledgehammers and dumbbells from falling out of the sky.

UNADILLA ANTENNA MANUFACTURING CO.

(508)

474-8949
24 Hour FAX

PO Box 4215 BV-Andover-MA-01810

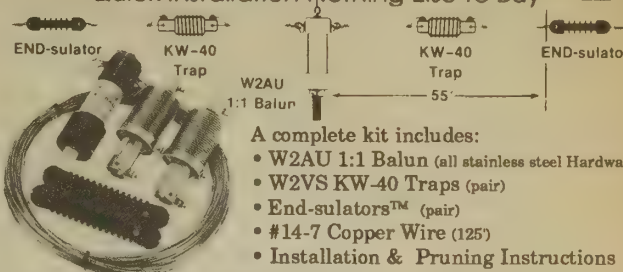
(508)

475-7831
9-5 EST M-F

THE BIG SIGNAL Amateur Antenna Kit

40/80 Meter Antenna Kit For "Perfect Dipole" SWR

Quick Installation-Nothing Else to Buy



A complete kit includes:

- W2AU 1:1 Balun (all stainless steel Hardware)
- W2VS KW-40 Traps (pair)
- End-sulators™ (pair)
- #14-7 Copper Wire (125')
- Installation & Pruning Instructions

Get "perfect dipole" (low SWR) operation on both bands, plus "second resonance" operation on 10, 15 and 20 meters. Complete instructions results in a quick, accurate installation and pruning to low operating SWR.

Every component in the 40/80 meter kit is an old line, reliable UNADILLA product, time tested with hams for over 20 years.

Contact Your Local Ham Dealer Today!!!

To order direct call (508) 475-7831 or write for our informational brochure on our other fine products
Baluns-Antenna Kits-Filter-Insulators-ENDsulators™-Coaxial Relays
All products come with a 30 Day Warranty

-NOTICE-

We are the NEW manufacturers of the original

JAMES MILLEN™ Products
(508) 975-2711 9am-5pm EST M-F

CIRCLE 136 ON READER SERVICE CARD

**Run your
classified in
FLEA MARKET
Call Sue Colbert
Today
800-225-5083**

Easy...Easy...Easy...

Learn Morse Code
by using

Mr. Morse

The only program which
can tutor you to receive
and transmit Morse Code

This is a new software for IBM computers/compatibles with EGA, VGA, HGA, or MCGA graphic card. Mr. Morse is a user friendly program which uses adult training techniques. You can adjust the speed, sound pitch, add sound distractions, and select the message content to include syphe code, words, Q-codes, sentences, score your own or let the program do it for you. Used by the Naval Reserves in Canada. The receiving module is \$34.95 US. Add the transmitting module for \$19.95 US. Both for \$49.95 US. Add \$5 S & H.

MARCOMP

402-130 Keith Road West, North Vancouver, B.C.

Canada V7M-1L5

(604) 980-5718, (604) 988-6455 fax

"Dealer Inquiries Welcome"

CIRCLE 48 ON READER SERVICE CARD

Radio Fun flea market

Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 100,000 active ham potential buyers can see it, rather than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar, and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The *Radio Fun Flea Market* costs you peanuts (almost)—comes to 10 cents a word for individual (noncommercial) ads, and 70 cents a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple of months before the action starts; then be prepared. If you get too many calls, you priced it too low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right, and maybe you can help make a ham newcomer or retired old-timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested.

Send your ads and payment to *Radio Fun Flea Market*, Sue Colbert, Forest Road, Hancock NH 03449 and get set for the phone calls.

HOBBY/BROADCASTING/HAM/CB/SURVEILLANCE transmitters, amplifiers, cable TV, science, bugs, other great projects! Catalog, \$1.00. PANAX-IS, Box 130-R9, Paradise CA 95967. **RF232**

GIANT SOLAR PANELS \$44.00 EACH! Excellent Prices/Solar Equipment/Accessories. Free Information/S.A.S.E., Catalog \$3.00. To: Pak Rat Electronics, Box 690073, Houston TX 77269. (713) 893-0313. **RF244**

SIMPLEX REPEATERS \$149.00! We manufacture them ourselves. Pak Rat Electronics. (713) 893-0313. **RF245**

MAXRAD TWO-METER ANTENNAS: base/mobile/portable. Call 1-800-283-2337, ext. 08883. Spreng Communications, Lake Crystal MN 56055-1002. **RF246**

GIFT IDEA! Morse code music—see our ad in the ad index (under Kawa Productions). **RF247**

RECEIVER, CONVERTER, 2-WAY

RADIO EQUIPMENT. Test equipment, antennas. Have lots & will ship! Phone for list—Rene VE6WCA, Ph/Fax (403) 436-3427. **RF248**

QSLs. INEXPENSIVE, CUSTOMIZED. Free samples. K2MK, 551 Norwood Road, Mt. Laurel NJ 08054. FAX (609) 778-8683. Postage appreciated. **RF249**

WANTED—GOOD QUALITY GENERAL COVERAGE RECEIVER that will tune WARC bands with decent spread. Want to see—within 250 miles. No phone—write: Joe Mocker W2CZP, 215 Oregon Ave., Schenectady NY 12304. **RF250**

MINIATURE POLICE RADAR TRANSMITTER one mile range, \$41 assembled, \$31 kit, (219) 489-1711. P.O. Box 80096, Fort Wayne IN 46898. **RF251**

KENWOOD TR-2600—2 METER FM HT 3-yr. old, one owner. With 2 new NiCd battery packs, wall charger, 1 hard leather case & clip, 1 Kenwood speaker mike—MINT condition—10 memories with backlit dial—beautiful little radio. Great for new Techs. (412) 531-7443. **RF253**

COMPLETE HF SSB—CW STATION No antenna \$160. I ship. MINT. N3IMJ, 257 Sebring Ave., Pittsburgh PA 15216. (412) 531-7443 anytime. **RF254**

BEGINNER KITS. Receivers, transmitters, and more. Stamp for catalog, 624 KITS, 171 Springlake Drive, Spartanburg SC 29302. **RF261**

JUST IMAGINE YOUR OWN BLUE RIDGE MOUNTAIN TOP 25-acre QTH in the cool, green mountains, only \$975 per acre. Wonderful view, wild game, privacy, road frontage, small stream, ideal for hamming, retirement or summer home. Financing available. KK4WW, Floyd VA. (703) 763-3311. **RF262**

PREMIUM QSL CARDS Unique colorful designs, starting at \$75 for 250. Send \$1.00 for catalog and samples. BVE Professional Printing, 2023 Chicago Avenue, Suite B13-3, Riverside CA 92507. Tel. (714) 781-0252. **RF264**

WANTED: Yaesu FT-23R-HT and pre-1980 microcomputers for museum. KK4WW, (703) 231-6478/763-3311. **RF265**

REPOSSESSED VA & HUD HOMES available from government from \$1 without credit check. You repair. Also S&L bailout properties. Call 1 (805) 682-7555, ext. H-5079 for repo list your area. **RF269**

SEIZED CARS, trucks, boats, 4wheelers, motorhomes, by FBI, IRS, DEA. Available your area now. Call 1 (805) 682-7555, ext. C-4546. **RF270**

HOME-BREW COMPONENTS: MPF-102 4/\$1.00 NE602AN \$1.95 ea. T-50-6 4/\$1.00, over 400 bargains, catalog LSASE. KA7QJY, Box 7970, Jackson WY 83001. (1-307-739-1634, evenings.) **RF271**

NEW!! NEW!! NEW!! NEW!! SPEAK TO THE WORLD Amateur radio language guide. •Written especially for the ham radio operator. •Hundreds of phrases. •Volume 1—incl. Spanish, German, French, Polish, and Japanese. •Volume 2—incl. Swedish, Italian, Portuguese, Croatian, and Norwegian. •Send \$10.00 per volume in U.S. (all others add \$2.50 S&H). ROSE, P.O. Box 796, Mundelein IL 60060-0796. **RF273**

LAMBDA AMATEUR RADIO CLUB International amateur radio club for gay and lesbian hams. On-air skeds, monthly newsletter, and annual gathering at Dayton. (215) 978-LARC. P.O. Box 24810, Philadelphia PA 19130. **RF812**

FREE Ham Gospel Tracts, SASE, N3FTT, 5133 Gramercy, Clifton Hts. PA 19018. **RF960**

QUADS 2 METER 4-ELE/440 8-ELE. \$79.95. Lightning Bolt Antennas, RD 2 Rt. 19, Volant PA 16156. (412) 530-7396. **RF992**

BUILD 35 FT. FREE-STANDING TILT-OVER TOWER. Plan book, \$8.95 plus \$1.00 S&H. Other books available. Ginery, P.O. Box 75, Fordland MO 65652-0075. **RF993**

CONNECTICUT'S FAVORITE HAM STORE Rogus Electronics, 250 Meriden-wtby Turnpike, Southington 06489. (203) 621-2252. **RF994**

Join FAIRS—The Foundation for Amateur International Radio Service. FAIRS is hams dedicated to building international friendship by providing technical assistance, training, exchange visits, and equipment donations on a global basis. Free information. P.O. Box 341, Floyd VA 24091. (703) 763-3311/382-9099. **RF995**

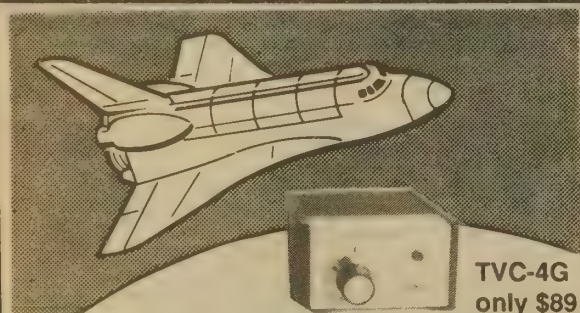
SECRET SCANNER Frequencies: Federal, Police, Aero, Military, Cellular, Surveillance, also SWL & CB Books. Big FREE catalog! CRB Research, Box 56-RF, Commack NY 11725. **RF996**

CERTIFICATE HUNTING IS FASCINATING! Rules for over 1700 awards in K1BV'S latest Directory. \$17.45. Ted Melinosky, Box 960, Keene NY 03431-0960. **RF997**

VHF-UHF-SHF Large SASE, VHFer, P.O. Box 685, Holbrook AZ 86025. **RF998**

AMATEUR RADIO REPAIR!! All makes & models, any age. \$20.00 per hour—maximum labor per unit, \$80.00. TELO (Dan), 1302 S. Uplands Dr., Camano Island WA 98292. (206) 387-3558. **RF999**

AMATEUR TELEVISION



TVC-4G
only \$89

SEE THE SPACE SHUTTLE VIDEO

Many ATV repeaters and individuals are retransmitting Space Shuttle Video & Audio from their TVRO's tuned to Satcom F2-P transponder 13. Others may be retransmitting weather radar during significant storms. If it is being done in your area on 70 CM - check page 413 in the 91-92 ARRL Repeater Directory or call us, ATV repeaters are springing up all over - all you need is one of the TVC-4G ATV 420-450 MHz downconverters, add any TV set to ch 2, 3 or 4 and a 70 CM antenna. We also have downconverters and antennas for the 900 and 1200 MHz amateur bands. In fact we are your one stop for all your ATV needs and info. Hams, call for our complete ATV catalog - antennas, transceivers, amplifiers. We ship most items within 24 hours after you call.

(818) 447-4565 m-f 8am-5:30pm pst. Visa, MC, COD
P.C. ELECTRONICS Tom (W6ORG)
2522-WG Paxson Ln Arcadia CA 91007 Maryann (WB6YSS)

World Map Prefix T-shirt

Great for:
Field Day
Club Meetings
Flea Markets
X-mas Gifts
Antenna Raisings
Formal Parties
Office
Weddings
Etc.
Allow 4-6 weeks delivery

FULL COLOR
100% Cotton
100% US Made

X-Large fits all

World map on front and back with country prefixes
Send your check or money order for \$19.95 + 3.00 S&H To:
HAMWEAR, 9232 Merlin Drive, Pittsburgh, PA 15237
Specify background color: ☐ White ☐ Sky Blue
(Pennsylvania residents add 6% sales tax)
Please mention this ad

AMATEUR TELEVISION QUARTERLY (ATVQ)

WE TELL YOU WHAT OTHER MAGAZINES DON'T!
COMPLETE COVERAGE OF HAM TV

Discover the Fun and Excitement of Ham TV: DX, mobile, portable, space shuttle, R/C model, public service, construction projects. Sample \$4. Subscription \$15 US, \$20 Canada, \$35 DX. Just starting? Get "ATV Secrets for Aspiring ATV'ers." Covers everything you need to know to have fun and start cheap and easy in ATV. Includes index to over 500 recent ATV articles. \$4.00 post paid (US/Canada) \$2.50 with subscription order. V/MC.

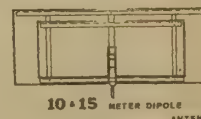
ATVQ
1545 Lee
Des Plaines, IL 60018
708-298-2269
FAX 708-803-8994.

CIRCLE 45 ON READER SERVICE CARD

D & C LIFF DWELLER



NEW!



10 x 15 METER DIPOLE
ANTENNA PATENT PENDING

"COMPACT AND ATTRACTIVE" A great kit, fun to build, fun to operate!!

•THE TWO BAND DIPOLE—each antenna is a half wave, and like the single band model, is tuned to frequency by adjusting the ends of the antenna for minimum S.W.R.

•ADJUSTABLE HAIRPINS—one for each antenna, to match your 52 ohm feed lines.

•NO TUNER NECESSARY—broad band coverage!!

•NO COILS! NO LOSSY TRAPS!

•COPPER & FIBERGLASS construction

•LIGHT WEIGHT, SMALL—turn with small rotor or it works well stationary. 15 meters has a turning radius of only 4ft.3in.!

•EASY & FAST TO SET UP—for emergency or field day

COMPLETE STEP BY STEP INSTRUCTIONS ON THE BUILDING & TUNING OF THE ANTENNA

• ALL CRITICAL COMPONENTS SUCH AS HAIRPINS & ADJUSTABLE ARMS ETC. ARE PREASSEMBLED AT THE FACTORY •

PLUS
UPS
CHARGE

\$15
NO COD PLEASE!!

D & C LIFF DWELLER
PO BOX 5114, DOVER NH 03820

HAVE
FUN
DX-ING

ONLY \$299

GREAT FOR DX

GREAT FOR LOCAL

GREAT FOR THE SWL

GREAT FOR YOU!!

SINGLE BAND DIPOLE

ANTENNA PATENT PENDING

10 OR 15 METERS

\$179

15 METERS \$192

NEW!

CIRCLE 252 ON READER SERVICE CARD

Uncle Wayne's Bookshelf

BOOKS FOR BEGINNERS

20N018 Technician Class License Manual: New No-Code by Gordon West This book will cover everything you need to become a Technician Class Ham. Every exact question and answer on the examinations is found in this one book covering element 2 and element 3A question pools. Gordon West tells you the right answer and then explains in detail why the answer is correct. Fully illustrated text, frequency chart showing privileges, list of examiners and an FCC Form 610 application. \$9.95

01B65 The Beginner's Handbook of Amateur Radio—2nd Edition by Clay Laster combines theory and practice in an easy-to-understand format, and provides information for choosing and installing radio receivers and transmitters, antennas, transmission lines, and test equipment. 400 pages, 291 illustrations. \$18.50

20N092 The Wonderful World of Ham Radio by Richard Skolnik, KB4LCS This book addresses the plea that something simple, clear, and fun be written to introduce young people to amateur radio. Pick up one for the new ham in your life. \$7.95

20N099 Digital Electronics Projects for Beginners by Owen Bishop contains 12 digital electronics projects suitable for the beginner to build with the minimum of equipment. 128 pp., 56 line drawings \$12.50

20N100 Electronics Build and Learn (2nd edition) by RA Penfold combines theory and practice so that you can "learn by doing." Full construction details of a circuit demonstrator unit that is used in subsequent chapters to introduce common electronic components. Describes how these components are built up into useful circuits, oscillators, multivibrators, bistables, and logic circuits. 128 pp., 18 photos, 72 line drawings. \$12.50

AR2073 Novice Antenna Notebook A beginner's guide to easy and effective antennas and tuners you can build. \$8.00 An ARRL Publication.

AR2871 W1FB's Help for New Hams by Doug DeMaw W1FB Complete for the newcomer. Put together a station and get on the air. \$10.00 An ARRL Publication.

AR2286 First Steps in Radio by Doug DeMaw W1FB Series of QST articles. See components assembled into practical circuits and how the circuits make up your radio gear. \$5.00 An ARRL Publication.

07R25 The RTTY Listener by Fred Osterman New and expanded version. This specialized book compiles issues 1 through 25 of the *RTTY Listener*

SHORTWAVE

Newsletter. It contains up-to-date, hard-to-find information on advanced RTTY and FAX monitoring techniques and frequencies. 224 pages. \$19.95

09S42 The Scanner Listener's Handbook by Edward Soomre N2BFF Get the most out of your scanner radio. Covers getting started, scanners and receivers, antennas, coaxial cable, accessories, computer controlled monitoring, more. \$14.95

03S208 Radioteletype Press Broadcasts by Michael Schay Covers schedules of Press Services by time, frequency, and country broadcasting in English, French, German, Spanish, and Portuguese. Detailed Press Agency Portraits. 120pp. \$12.95

03K205 Guide to Radioteletype (RTTY) Stations by J. Klingenfuss Updated book covers all RTTY stations from 3MHz-30MHz. Press, Military, Commercial, Meteor, PTTs, embassies, and more. 105 pp. \$12.95

11RF13 The "Top Secret" Registry of US Government Radio Frequencies (7th Ed.) by Tom Kneitel K2AES This scanner directory has become the standard reference source for frequency and other important information relating to the communications of federal agencies. 25 to 470 MHz. \$19.95

11F52 Ferrell's Confidential Frequency List compiled by A.G. Halligey All frequencies from 4MHz—28MHz covering ship, embassy, aero, Volmet, Interpol, numbers, Air Force One/Two, more 376 pp. \$19.50

11EE06 Guide to Embassy Espionage Communications by Tom Kneitel K2AES Candid and probing examination of worldwide embassy and (alleged) espionage communication systems and networks. Extensive nation-by-nation directory of embassy stations is included. \$10.95 Advance the easy way with VIS Study Cards. Compact, Up-to-date Flash Cards with Key Words.

VIS Study Cards

Underlined Quiz on back. Formulas worked out. Schematics at your fingertips. Used SUCCESSFULLY by ages 6 to 8!

NOVICE	VIS01	\$11.95
TECH	VIS02	10.95
GENERAL	VIS03	9.95
ADVANCED	VIS04	15.95
EXTRA	VIS05	14.95

Lanze Code Programs—(Available on 5 1/4" disk.) Inexpensive complete study guide code programs for both the C64/128 Commodores and the IBM compatibles. Programs include updated FCC questions, multiple choice answers, formulas, schematic symbols, diagrams, and simulated (VE) sample test.

IBM Part#	Commodore Part	Price
Novice	IBM01	COM01 \$14.95
Tech	IBM02	COM02 \$14.95
General	IBM03	COM03 \$14.95
Advance	IBM04	COM04 \$19.95
Extra (New Pool)	IBM05	COM05 \$19.95

IBM06, COM06 IBM/Commodore Tech No Code—Lanze Code Program contains all the authorized FCC questions and answers used in testing formulas, schematic symbols, diagrams, and sample test for passing the new Technician No Code license. \$24.95

ANTENNAS

05A95 Easy-up Antennas for Radio Listeners and Hams by Edward M. Noll Like to learn how to construct low-cost, easy-to-erect antennas? *Easy-up Antennas* will help you. \$16.50

10A345 Beam Antenna Handbook by William Orr W6SAI/Stuart Cowan W2LX Yagi beam theory, construction, operation. Wire beams, SWR curves, Matching systems. A "must" for serious DXers. \$11.95

10A343 All About Cubical Quad Antennas by William Orr W6SAI/Stuart Cowan W2LX The "Classic" on Quad design, theory, construction, operation. New feed and matching systems. New data. \$9.50

10A346 Simple, Low-cost Wire Antennas for Radio Amateurs by William Orr W6SAI/Stuart Cowan W2LX All New! Low-cost, multi-band antennas; inexpensive beams. "Invisible" antennas for hams in "tough" locations! New data. \$11.50

01A70 Practical Antenna Handbook by Joseph J. Carr Design, build, modify, and install your own antennas. Carr, a 20-year veteran of technical writing, has a unique ability to present complex technical concepts in an easy-to-understand way. 416 pp. \$21.50

UHF/VHF/PACKET

10A347 All About VHF Amateur Radio by William Orr W6SAI DX propagation, VHF yagi and quad beams, repeaters and how they work, OSCAR satellites and how to use them. \$11.95

03R02 RTTY Today by Dave Ingram K4TWJ Only up-to-date RTTY book in existence. Covers all facets of RTTY. Most comprehensive RTTY guide ever published. Fully illustrated. 112 pages. \$8.50

01P22 The Packet Radio Handbook by Jonathan L. Mayo KR3T "...an excellent piece of work. Well worth reading for both the experienced and the new packeteer...the definitive guide to amateur packet operation."—Gwyn Reedy W1BEL Only \$14.50

ARRL BOOKS

AR1991 ARRL 1991 Handbook (68th ed.) 39 chapters, featuring 2,100 tables, figures and charts. The most comprehensive, well-organized and affordable source of amateur radio reference material. 1232 pages. \$25.00

AR1086 ARRL Operating Manual Packed with information on how to make the best use of your station, including: Interfacing home computers, OSCAR, VHF-UHF, contesting. \$15.00

AR0194 Antenna Compendium Vol. 1 Materials on verticals, quads, loops, yagis, reduced size antennas, baluns, Smith Charts, antenna polarization, and other interesting subjects. \$10.00

AR2545 Antenna Compendium Vol. 2 42 papers covering verticals, yagis, quads, multiband and broadband systems, antenna selection, and much more. \$12.00

AR2626 Companion Software for Antenna Compendium Vol. 2 5 1/4" MS-DOS floppy. \$10.00

AR0488 W1FB's Antenna Notebook by Doug DeMaw W1FB Get the best performance out of unobtrusive wire antennas and verticals. Build tuners and the SWR bridges. \$8.00

AR0348 QRP Notebook by Doug DeMaw W1FB Presents construction projects for the QRP operator, from a simple 1 watt crystal-controlled transmitter to more complex transceiver designs. \$6.00

AR4141 W1FB's Design Notebook by Doug DeMaw W1FB This plain language book is filled with simple practical projects that can be built using readily-available components and common hand tools. \$10.00

AR3291 Now You're Talking: Discover the World of

Ham Radio Successor to the immensely popular *Tune in the World with Ham Radio*. Covers everything you need to know to earn your first Amateur Radio license. More than a study guide, this book will help you select equipment for your ham radio station and explain how to set it up—everything you'll need to know to get on the air! An ARRL Publication. \$19.00

AR3292 Your Introduction to Morse Code: Practice Cassettes companion code course to *Now You're Talking!*, this kit includes two 90 minute cassette tapes. Prepares you for the 5 WPM Morse code exam to earn your Novice license or add high-frequency worldwide communications privileges to your code-free Technician license. \$10.00

AR1033 The DXCC Companion by Jim Kearnan KR1S spells out in simple, straightforward terms what you need to be a successful DXer. \$6.00

ARA341 Interference Handbook Written from an RFI sleuth's perspective. His experience in solving interference problems. \$12.00

ARRL License Manuals all the theory you need to pass your test. Complete FCC question pools with answers.

AR2375	Technician Class	\$6.00
AR2383	General Class	\$6.00
AR0166	Advanced Class	\$6.00
AR2391	Extra Class	\$6.00

AR0437 ARRL Repeater Directory 1991—1992 Almost 18,000 listings with over 2200 digipeaters. Band plans, CTCSS (PL™) Tone Chart, compilation of frequency coordinators, ARRL Special Service Clubs, and 500 beacon listings from 14MHz to 24GHz. \$6.00

AR2171 Hints and Kinks Find the answer to that tricky problem. Ideas for setting up your gear for comfortable, efficient operation. \$8.00

AR3169 QRP Classics Collection of articles from the last 15 years of ARRL publications on building receivers, transmitters, transceiver, accessories, 288 pp. \$12.00

AR2030 Your Gateway to Packet Radio (2nd ed.) Tells everything you need to know about this popular new mode; how to get started, equipment you need, and more. \$12.00

AR2456 FCC Rule Book (8th ed.) a must for every active radio amateur. \$9.00

AR2083 Complete DX'er (2nd ed.) by Bob Locker W9KNI Learn how to hunt DX and obtain hard-to-get QSL cards. \$12.00

20N104 Ham Stuff—The Who—What—Where of Amateur Radio by Walt Garrett this is the indispensable new guide to everything in Ham Radio. If you want to know who's on first and what's what, this valuable guide belongs in your shack. You'll refer to it again and again to find just the right equipment, where to ship, and who to call. Everything from radios to QSL cards to hat pins, complete with product descriptions, vendor profiles, prices, and more. \$19.95

AR2065 ARRL Antenna Book The new 16th edition represents the best and most highly regarded information on antenna fundamentals, transmission lines, design, and construction of wire antennas. Over 700 pages, over 900 figures. An ARRL Publication. \$20.00

We carry all ARRL books. Call for Prices!

CODE TAPES

73T05 "Genesis" \$5.95

5wpm—This is the beginning tape, taking you through the 26 letters, 10 numbers, and necessary punctuation, complete with practice every step of the way.

73T06 "The Stickler" \$5.95

6-wpm—This is the practice tape for those who survived the 5 wpm tape, and it's also the tape for the Novice and Technician licenses.

73T13 "Back Breaker" \$5.95

13+ wpm—Code groups again, at a brisk 13+ wpm so you'll be really at ease when you sit down in front of a steady-eyed volunteer examiner who starts sending you plain language code at only 13 per.

73T20 "Courageous" \$5.95

20+ wpm—Congratulations! Okay, the challenge of

code is what's gotten you this far, so don't quit now. Go for the extra class license. We send the code faster than 20 per.

REFERENCES

20N101 Everyday Electronics Data Book by Mike Toolay BA Information is presented in the form of a basic electronic recipe book with numerous examples showing how theory can be put into practice using a range of commonly available "industry standard" components and devices. 256 pp. 134 line drawings. \$18.00

02C30 The Commodore Ham's Companion by Jim Grubbs K9EI 160 pages of useful information on selecting a Commodore computer for the ham shack, where to find specialized programs, the Commodore-packet connection, and more! \$9.50

10M44 World Atlas by Radio Amateur Callbook Inc. 20 pp. of full color, 8 3/4" x 10 7/8", contains North Polar projection of the world; maps of all seven continents, West Indies/Caribbean area, and Pacific Ocean. \$5.00

10F091 1991 International Callbook The new 1991 International Callbook lists 500,000 licensed radio amateurs in the countries outside North America. It covers South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions). \$29.95

10D091 1991 North American Callbook The 1991 North American Callbook lists the calls, names, and address information for over 500,000 licensed radio amateurs in all countries of North America, from Panama to Canada including Greenland, Bermuda, and the Caribbean Islands, plus Hawaii and U.S. possessions. \$29.95

05H24 Radio Handbook, 23rd Ed. by William I. Orr W6SAI 840 pages of everything you wanted to know about radio communication. In-depth study of AC/DC fundamentals, SSB, antennas, amplifiers, power supplies, and more. \$29.50 hard cover only.

01D45 The Illustrated Dictionary of Electronics, 5th Ed. by Rufus P. Turner and Stan Gibilisco Featuring more than 27,000 entries, an exhaustive list of abbreviations, and appendices packed with schematic symbols and conversion tables, this is by far the most comprehensive dictionary of practical electronics and computer terms available. 720 pages \$26.95

04M54 GGTE Morse Tutor From beginner to Extra class in easy self-paced lessons. Code speeds from 1 to over 100 words per minute. Standard or Farnsworth mode. Adjustable tone frequency. Create your own drills, practice or actual exams. Exams conform to FCC requirements. 5 1/4 floppy for IBM PC, XT, AT, PS/2 or compatibles. \$19.50

04M55 Advanced Edition \$29.95

IBM97 Amateur Radio Part 97 Rules (includes updates, revised Commission's Rules, September 30, 1989) 5 1/4" disk IBM compatible only. \$9.95

20N096 How To Read Schematics (4th edition) by Donald E. Herrington Written for the beginner in electronics, but it also contains information valuable to the hobbyist and engineering technician. This book is your key to unlocking the mysteries of schematics, beginning with a general discussion of electronic diagrams. \$14.95

20N097 Radio Operator's World Atlas by Walt Stinson, W0CPC This is a compact (5 x 7), detailed, and comprehensive world atlas designed as a constant desk top companion for radio operators, and as a replacement for the traditional bulky and outdated atlases. Also included are 42 pages of vital statistics about each country. Popular with DXers worldwide. \$17.95

NEW STUFF

U.S. Repeater Mapbook by William Smith, N6MQS The guide for traveling radio amateurs gives you repeater frequencies, and locations on easy to read state map. Includes all 50 states and 28-1200MHz.

20N019

\$9.95

AEA
ASTRON
BUTTERNUT
CALLBOOK
COMET
DIAMOND
HUSTLER
KANTRONICS
LASER
COMPUTERS
MFJ
RADIO SHACK
SMILEY
ANTENNAS
TEN-TEC
VALOR
ANTENNAS
& more.

Small town
service with
discount prices.
DANDYS
120 N. Washington
Wellington, KS 67152
(316) 326-6314

CIRCLE 130 ON READER SERVICE CARD

TO ADVERTISE IN THE RADIO FUN
FLEA MARKET
CALL SUE COLBERT
1-800-225-5083

Uncle Wayne's Bookshelf Order Form

You may order by mail, telephone, or fax. All payments are to be in US funds. Allow 3 weeks for delivery.

Item #	Title	Qty.	Price	Total

SHIPPING

TOTAL

SHIPPING
U.S. add \$3.00 mail, \$4.00 UPS
Canada add \$4.00 mail.
U.P.S. to Canada and all foreign orders FOB Peterborough, NH.
Foreign orders will be billed actual shipping charges.

Name _____

Street _____

City _____ State _____ Zip _____

TOTAL \$ _____ ☐ AE ☐ MC ☐ VISA ☐ Check/Money Order

Card # _____ Expiration Date _____

Telephone: (603) 924-4196 (800) 234-8458 FAX: (603) 924-8613

Mail: 73 Magazine, Attn. Uncle Wayne, PO Box 3080, Peterborough, NH 03458

RF1291

PUT SOME EXCITEMENT INTO YOUR HOBBY!!

73 Amateur Radio Today



No other magazine brings you the exciting world of amateur radio like *73 Amateur Radio Today*.

- Equipment reviews you can use.
- Construction projects for all abilities.
- More antenna articles than any other magazine.
- Monthly columns covering the exciting worlds of RTTY, ATV, microwaves, QRP, DX, foxhunting and more.
- "Never Say Die," Wayne Green's monthly view of the world of amateur radio.

— 12 issues for \$19.97 —

That's a 56% savings off the newsstand price!

CALL 1-800-289-0388

or send \$19.97 to

73 Amateur Radio Today • Forest Rd. • Hancock, NH • 03449

Allow 4 - 6 weeks for first issue. Canada add \$7.00 plus \$1.40 GST.

Foreign add \$19 surface/\$42 airmail

vintage RF review

Heath HW-9 QRP CW Transceiver

by Mike Bryce WB8VGE

Radio Fun is pleased to bring you another Vintage Review of classic used equipment. Although Heathkit no longer produces the HW-9, keep an eye out for it at hamfests, swap nets or via the want ads.

The HW-8 is a tough act to follow, but the Heath Company is betting on the HW-9 to take over now that the HW-8 is no more. After selling more than 15,000 units, Heath quietly removed the HW-8 from their catalog. This left a vacuum in under-5-watt transceivers, since Ten-Tec also dropped the Argonaut 515. No one seemed too eager to fill this void. That is until now, with the HW-9, a third-generation QRP (low power) transceiver from Heath.

The HW-9 is a CW-only transceiver that covers 80 through 15 meters. With the accessory HWA-9 band pack, you can extend coverage to all the WARC bands and the lower 250 kHz of 10 meters. The HW-9 also has full break-in keying (QSK), plus a newly designed wideband front end for no-tune-up operation.

I really don't know why Heath supplies screws for any of their radios—everyone who comes to my shack wants to see the insides of the newest Heath creation. Inside there are not one but two circuit boards, the oscillator and T/R circuit boards. Neither of the boards is double-sided, and both the boards are the same size as the case. It's quite crowded inside the HW-9, perhaps because Heath used the same size case as the old HW-8. They must have had some extra ones lying about in the metal shop. Gone is the infamous two-tone Heath green color scheme; in its place is a new bronze paint job.

Features

The front panel has also been redesigned. Band selection is now done via a rotary switch instead of the older push-buttons, as was the case with the HW-8. Yelling and screaming from HW-8 users helped add two new features to the HW-9: receiver incremental tuning (RIT) and a superhet receiver (to succeed the often-cursed direct-conversion receiver that the HW-7 and HW-8 sported). The superhet receiver utilizes a 9 MHz IF and a four-pole crystal filter. An improved active audio

filter and an audio amplifier that will drive a speaker or low-impedance headphones round things out for the receiver. The front-mounted meter gives relative S-units during receive and functions as a relative output meter during transmit.

The transmitter this time around had the power boosted to 4 watts output on all bands except 10. You'll get 3 watts out on 10 meters. A front-panel control will vary the transmitter output from zero to full power. The power amplifier is made up of two transistors in parallel to produce the RF output. A zener diode straps the collectors of both transistors to ground for protection against high SWR on the antenna. The HW-9 requires an external power supply that can supply 12.6 VDC at at least 1 ampere.

Construction

[Editor's note: It's unlikely that you'll find an unassembled HW-9, but do ask for a manual nonetheless in case you have to do any troubleshooting.]

Of course the HW-9 comes in kit form. I was surprised to see that only two pages of changes were included. What can I say about the manual?

strips. Each circuit board is set up in sections. By locating the proper taped parts, all one has to do is stuff the correct section. This sure is different from what I have been used to in the past from Heath. I did have some trouble with this new system. I started to go too fast and ignore the check-offs in the book. Somehow, in the wee hours of the morning, I got screwed up and installed parts in the wrong place on the T/R board. I recommend a slow pace when installing the taped components.

Construction begins with the oscillator board. Things went along quite well for a while until trouble raised its ugly head. The oscillator circuit board seemed to have a lot of extra holes left over after all the taped parts were installed. Hummmm, seems these are for the optional WARC band kit. Well, take it from me, install the WARC

used to mark the coaxial cables. After checking the soldering on both boards, you can finally get down to putting things together.

Mechanical assembly went smoothly. The end was in sight. VFO capacitor and front-panel controls were added to the chassis. The HW-9 started to take shape.

The HW-9 is a solid performer. QRP operator, Novice or CW buff will find it a welcome addition to the shack.

Alignment

After all the parts are installed, we can start some resistance tests. Now, I have to confess that I'm not much for doing resistance tests when building equipment. I did a few and things looked good, so I went on to alignment.

Alignment of the HW-9 requires the use of a VTVM or DVM, a frequency counter with a range to 10 MHz and an accuracy of 0.01%, and an RF detector—which Heath has built into the transceiver.

Everything seemed to be going just fine until I came to the VFO. Try as I could, I could not seem to get the VFO to track the dial. I spent most of an evening working on the problem. Oh, I did get things to perform, but only after I discovered that the main tuning dial slips. In fact, it slips a lot. The next morning I called Heathkit. Yep, we know of the problem, not much you can do, but here are some suggestions. Remove the VFO shield (the shield causes some binding). Reset the VFO capacitor (this may also cause some binding). Don't tune past the stops (this wears down the vernier drive). Well, I did all of the above and it worked, sort of. It appears that Heath, in order to keep the HW-9 the same size as the HW-8, had to use a much smaller vernier drive. The new drive is way too small for the job of tuning the VFO capacitor. What I finally did was to disassemble the vernier drive, bend the spring washers to add more drag, and reassemble it. So far, so good—I have not had any more trou-

ble with the drive slipping.

Having fixed that problem, alignment continued along smoothly for several more manual pages—until I came to the page containing the transmit bandpass alignment. While I didn't have trouble with the alignment proper, the way it has to be done is a real pooper! To adjust the coils for the 15 meter band, you have to remove the bandswitch shaft. That's not much fun. Take your time and things should go smoothly, I hope.

The balance of the alignment went without a hitch. Finally, I was able to press on the blue and white label to the bottom cover. The HW-9 was done.

Operation

Operation proved a pleasant surprise. After the sidetone was adjusted to my liking, I fired up on 40 and gave a quick listen. The receiver proved quite sensitive. The S-meter is a bit Scotch, but can be adjusted to the end user's need. I had some audio howling when I went to a band position that was not active (I did not install the WARC kit). I had one of the IF stages oscillating; re-tuning the coils remedied the difficulty.

With a bit more kick out of the transmitter, I was able to work just about everything I heard. The QSK, while not quite up to Ten-Tec standards, worked flawlessly. I like the QSK time to be a bit slow and was able to set the time to my liking. The RIT and the audio filters work well. A speaker plugged into the HW-9 provides plenty of audio.

Will the HW-9 replace the HW-8? It sure has a good start. With all the features that everyone wanted on the HW-8, plus no-tune operation and WARC coverage, the HW-9 will fit the needs of the low-power operator. The HW-9 is a solid performer. QRP operator, Novice, or CW buff will find it a welcome addition to the shack.

[Ed. Note: The author, Michael Bryce WB8VGE, writes our Radio Magic column, as well as the "QRP" column in 73 Amateur Radio Today. If you are now the proud owner of an HW-8 or HW-9, you might want to investigate his Hot Water Handbook (\$8.95), which describes modifications for the HW series of rigs. You can contact him at 2225 Mayflower NW, Massillon OH 44646.] **RF**

Reprinted from the August 1987 issue of 73 Magazine.



Photo A. The Heath HW-9 shown with the optional PSA-9 power supply.

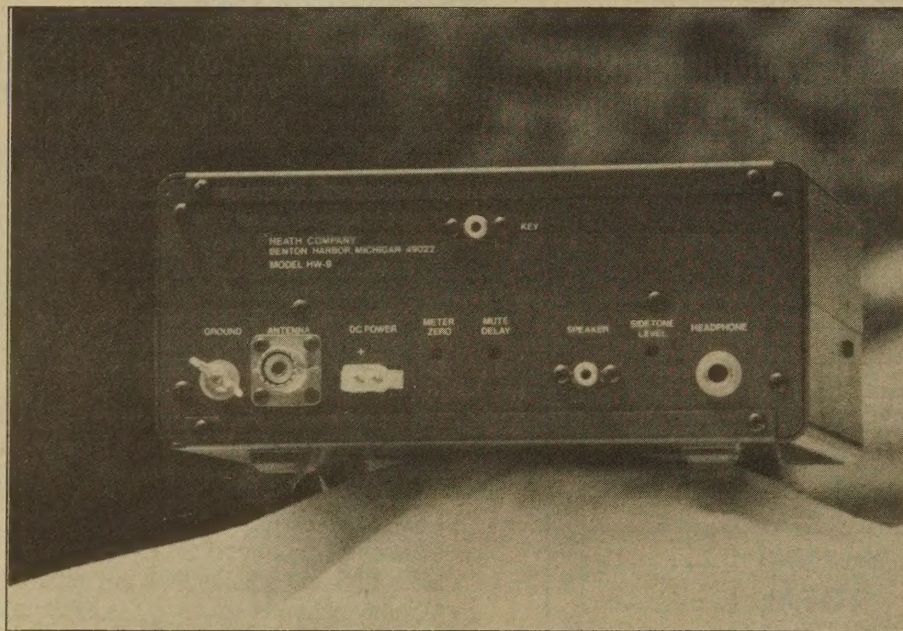


Photo B. Rear panel of the HW-9.

Classic Heathkit. I started construction by first cleaning off my work table, a major undertaking in its own right. I have to 'fess up a bit. Whenever I build a Heathkit, I never check parts off until they are ready to be installed. I do group like parts together in small piles; resistors in one pile, transistors in another, etc.

This HW-9 is the first Heathkit that I've assembled that uses taped components. Resistors, diodes, and small glass capacitors are mounted on tape

band kit while you're assembling the HW-9. To do so after the fact will involve a terrible amount of work.

The T/R board is quite dense. Use extra care with the tape components. There are two coils which must be wound for the transmitter. These must be done correctly or the transmitter will not work. After the boards are stuffed, cables are used to interconnect the different circuits. Instead of the usual Heath wiring harness, you make up your own. Small labels are

Ahead of the Competition... ...Again.

Let Yaesu give you what the competition can only dream about: powerful features, simple operation and streamlined styling in one amazing package.

The new compact FT-415/815 handheld radio deliver more than a dozen new features, including backlit keypad and display, louder audio output and large, easy-access buttons. Both the FT-415 and FT-815 offer 41 memories, built-in DTMF calling and paging, and four power levels via the FNB-27 battery. As if that's not enough, you can customize your FT-415/815 handheld with an array of optional accessories.

The competition is still working on a radio that's as powerful and easy to use as the FT-415/815 handheld. But why wait? Visit your Yaesu dealer today and leap ahead of the competition.

FT-415/815

2M/UHF Handheld Transceivers

FT-415: 130-174 MHz Rx 140-150 MHz Tx

FT-815: 430-450 MHz Rx/Tx

41 Memories (All memories store separate transmit and receive frequencies for "odd splits")

2 VFOS

- ① DTMF Calling and paging built-in
Built-in VOX
- ② Back-lit Keypad and Display (with time delay)
- ③ DC Direct Operation (Automatically Charges Battery with 12 Volts, FNB-25 only)
- ④ Four Power Levels (With FNB-27 Battery)
Direct Keyboard Entry for All Functions
Programmable and Automatic Battery Saver (ABS)
- ⑤ CTCSS Encode/Decode Built-In
5 Watts Output With FNB-27 or DC Direct
- ⑥ Rugged Case Construction
Automatic Power-Off (APO) Turns Radio Off Automatically After 30 Minutes
DTMF 10 Memory Autodialer, Built-In
Selectable Frequency Steps (5, 10, 12.5, 15, 20 or 25 KHz)
Four Ways to Scan (Band Scan, Memory Scan, Memory Skip, Programmable Scan)

Optional Accessories:

NC-42 1-Hour SMART Desk Charger

E-DC-5 DC Adaptor With Noise Filter

MMB-49 Mobile Mounting Bracket

YH-2 Headset for VOX Operation

FBA-12 AA 6-Cell Holder

Some accessories and options are standard in certain areas. Check with your Yaesu Dealer for details.

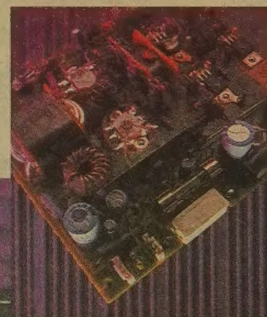
YAESU
Performance without compromise.

©1991 YAESU, 17210 Edwards Road, Cerritos, CA 90701

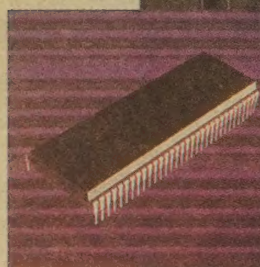
Shown Actual Size

Specifications subject to change without notice
Specifications guaranteed only within amateur bands
One Year Limited Warranty on all Amateur Products

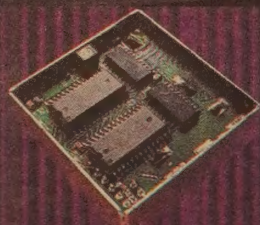
EXAMINE THE IC-725 PIECE BY PIECE



PA UNIT
provides 100%
duty cycle



CPU UNIT
contains
band
stacking
registers




DDS UNIT
provides excellent
signal-to-noise ratio

From the CPU to the DDS System to the final output board, the ICOM IC-725 is designed for you ... the amateur who demands relentless performance.

Whether its fixed, mobile or portable operation you desire, the IC-725 will open your eyes to what amateur radio should be. World renowned for excellence in circuit design, versatility and dependability, the IC-725 is backed by a full one-year factory warranty.

But don't take our word for it. Examine the IC-725 yourself, it's waiting at an ICOM dealer near you.


ICOM

CORPORATE HEADQUARTERS: ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004

CUSTOMER SERVICE HOTLINE (206) 454-7619

CUSTOMER SERVICE CENTERS: 18102 Sky Park South, Ste. 52-B, Irvine, CA 92714, 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349

3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada, 2380-116th Ave. N.E., Bellevue, WA 98004

All stated specifications are subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 725791

For a brochure on this or any other ICOM product, call our Toll-Free Literature Request Hotline 1-800-999-9877.

CIRCLE 179 ON READER SERVICE CARD